Petition

81-1303

No.

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IN THE

Supreme Court of the United States

OCTOBER TERM, 1981

STANDARD OIL COMPANY (INDIANA), a corporation of Indiana,

Petitioner,

v.

PHILLIPS PETROLEUM COMPANY, a corporation of Delaware.

PETITION FOR A WRIT OF CERTIORARI TO THE UNITED STATES COURT OF APPEALS FOR THE THIRD CIRCUIT

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Questions Presented

1. Does an award of priority based upon a patent application thwart public policy regarding contemporaneous recognition and appreciation of the making of an invention as reflected in 35 U.S.C. § 112, which requires that an application for a patent contain a written description of the invention in "full, clear, concise and exact terms", where such application:

> (i) nowhere describes the invention, a product, by the property determined by the Patent Office to be the essential point of novelty which distinguishes the new product from old products;
>
> (ii) describes the invention by properties from which workers skilled in the art reached conclusions at the time the application was filed contrary to the existence of that essential property; and
>
> (iii) contains a disclosure from which skilled workers in the art did not always and invariably produce the invention?

2. Does the judgment of the court of appeals upholding an award of priority based upon testimony at trial reinterpreting data in a patent application filed 24 years earlier, which testimony proposed conclusions contrary to those contemporaneously made from such data, conflict with applicable decisions of the Court of Customs and Patent Appeals holding that latter day interpretations cannot be substituted for contemporaneous conclusions?

3. Does the judgment of the court of appeals that upheld an award of priority based upon an inherent disclosure of the invention in an application, where products from experiments reproducing the disclosure of the application only sometimes were the invention, conflict with applicable deci-

sions of the Court of Customs and Patent Appeals holding that an inherent disclosure will be found only if the invention always and invariably is produced by following the disclosure of the application?

Parties to the Proceedings Below

The parties to the proceedings in the United States Court of Appeals for the Third Circuit, whose judgment is sought to be reviewed, included as appellants the petitioner herein, Standard Oil Company of Indiana ("Standard")* as well as Montedison, S.p.A. ("Montedison") and E. I. duPont de Nemours and Company ("DuPont").

In that appeal, each of the appellants contended that it was entitled to an award of priority to the invention in issue, and to that end sought a reversal of the judgment of the United States District Court for the District of Delaware which had awarded priority of invention to Phillips Petroleum Company ("Phillips"). The district court, acting under 35 U.S.C. § 146, had reversed an earlier award of priority to the invention made to Montedison by the Board of Patent Interferences of the United States Patent and Trademark Office.

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* Pursuant to Rule 28.1 of this Court, Petitioner Standard states that it has no parent. Affiliates, other than wholly-owned subsidiaries, in which Standard has a financial interest and which have publicly owned stock or debt instruments are: Amoco Canada Petroleum Company, Ltd., Amoco Oil Holdings S.A., Amoco Pipeline Company, Analog Devices, Cetus Corporation, Cyprus Mines Corporation, Solarex Corporation, Amoco (U.K.) Exploration Company and Chicago Bank of Commerce.

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PETITION FOR A WRIT OF CERTIORARI TO THE UNITED STATES COURT OF APPEALS FOR THE THIRD CIRCUIT

Petitioner prays that a writ of certiorari issue to review the judgment of the United States Court of Appeals for the Third Circuit, entered in the above entitled case on October 14, 1981.

Opinions Below

The opinion of the United States Court of Appeals for the Third Circuit (in Appeals Nos. 80-1553, 80-1554 and 80-1555 filed October 14, 1981), not officially reported as of this date, is printed as Appendix A (pp. 1a-43a) in petitioner's appendix filed herewith. The Opinion of the United States District Court for the District of Delaware, filed January 11, 1980, is reported at 494 F. Supp. 370 and is printed in Appendix B (pp. 44a-245a). The Opinion of

the Board of Patent Interferences ("Board") of the United States Patent Office rendered November 29, 1971, is unreported and is printed in Appendix C (pp. 246a-335a).

Jurisdiction

The judgment of the United States Court of Appeals for the Third Circuit was entered October 14, 1981. This Petition for a Writ of Certiorari is being filed within ninety (90) days of that date. The jurisdiction of this Court is invoked under 28 U.S.C. § 1254(1).

Statutes Involved

The statutory provisions involved herein are those of the Patent Act of 1952, and specifically, 35 U.S.C. §§ 101, 102, 103, 112, 119, 120, 135(a) and 146. These provisions are set forth in their entirety in Appendix F (pp. 341a-47a).

Statement of the Case

(a) The History of this Litigation

This case deals with the invention of crystalline polypropylene and traces its history to 1950. Prior to 1950, polymer chemists had been successful in producing solid polyethylene, a highly crystalline material which had become a widely used plastic for a variety of purposes. Although polypropylene had been made prior to 1950, no one had yet been able to produce a solid polypropylene which was crystalline and it was by no means certain that it would ever be possible to do so (p. 46a).

By February, 1956, the parties Standard (Zletz), Phillips (Hogan and Banks), Montedison (Natta, et al.) and DuPont (Baxter, et al.) had all filed United States patent applications claiming the invention of solid polypropylene possessing the hitherto unachievable property of crystallinity. It was this property of crystallinity, the essence of the inven-

tion in issue, which gave rise to an industry that in 1980 produced 3.6 billion pounds of crystalline polypropylene used in making textile fibers, films and sheets for packaging, and molded parts for a variety of industrial products, including cars and appliances ("Who Owns Polypropylene", *Chemical Week*, April 15, 1981, pp. 44 *et seq.*).

In 1958, pursuant to 35 U.S.C. § 135(a), the United States Patent Office declared Interference No. 89,634 in order to determine priority of invention of crystalline polypropylene among the individuals whose applications were assigned to the parties to this petition.[1] The procedural history of that interference is summarized in the opinion of the court of appeals (pp. 1a-4a) and the opinion of the district court (pp. 45a-49a).

In 1971, the Board of Patent Interferences awarded priority to Montedison (p. 335a). Thereafter, Standard, DuPont and Phillips each filed actions under 35 U.S.C. § 146 seeking a review of the Board's decision. On February 28, 1980, the district court entered judgment reversing the award of priority to Montedison and directing the award of priority to Phillips (Appendix D, pp. 336a-38a). Thereafter, Standard, Montedison and DuPont appealed the district court's judgment to the Third Circuit Court of Appeals which entered judgment on October 14, 1981, affirming the award of priority to Phillips (Appendix E, pp. 339a-40a).

(b) The Invention

When the interference began in 1958, the invention or

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[1] The names of the individuals following the corporate names above are the named inventors on the applications assigned to the parties to this petition. Interferences are conducted in the names of individual inventors. Thus, the title of Interference No. 89,634 was *Hogan et al.* v. *Zletz* v. *Baxter et al.* v. *Natta et al.*

"count" at issue was defined as:

> Normally solid polypropylene having a crystalline polypropylene component" (JA-I:A58).[2]

In 1962, the Patent Examiner redefined and established the count to be:

> "Normally solid polypropylene, consisting essentially of recurring propylene units, having a substantial crystalline polypropylene content" (JA-I:A58).

In so redefining the count, the examiner made clear that crystallinity was the point of novelty of the invention. The Examiner stated:

> "Actually, the *point of novelty* is the phrase 'having a substantial crystalline polypropylene content'. There is nothing of record to show that any of the references disclose a polypropylene having any crystalline polypropylene content" (JA-I:A81-82). (Emphasis added)

From the outset of the proceedings, the central issue among the parties has been who was the first to have recognized and appreciated that the polypropylene which it had made possessed the property of crystallinity, a property non-existent in prior art polypropylenes.

(c) Decisions Below

1. Board of Patent Interferences' Decision

In denying Phillips an award of priority, the Board found no express disclosure of either crystallinity or recurring propylene units in the application relied upon by Phillips, as required by 35 U.S.C. § 112 (pp. 273a, 277a). Since the Phillips application lacked a description of the invention in the "full, clear, concise and exact" terms required by the statute, Phillips asserted that the applica-

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[2] Portions of the record other than those appearing in the appendices to this Petition are identified by reference to the Joint Appendix ("JA") filed in the court of appeals. Citations to the Joint Appendix are by volume and page number. Thus, "JA-I:A58" refers to Vol. I of the joint Appendix at page A58.

tion inherently disclosed the invention. The Board rejected this assertion because the evidence consisted of latter day interpretation of properties of the Phillips product disclosed in the application and was at variance with contemporaneous conclusions by skilled workers in the art at Phillips. These contemporaneous conclusions (i) showed no recognition of crystallinity from such properties and (ii) "militated" against the product having recurring propylene units (pp. 278a, 294a-95a). In rejecting Phillips proofs, the Board refused to accept a *nunc pro tunc* interpretation of data, relying on precedent of the Court of Customs and Patent Appeals (p. 296a).

In the proceedings before the Board, Phillips was the most junior party based upon the Hogan et al. United States Patent Application Ser. No. 558,530 filed January 11, 1956, after Phillips had learned of the production by another of polypropylene which had been recognized and described as *crystalline* (JA-II:A983-1015). Phillips' 1956 application included at least 25 references to its polymers in terms of being "crystalline" or having "crystallinity". Since its 1956 application was too late to achieve an award of priority, Phillips, pursuant to 35 U.S.C. § 120, sought to rely upon its application Ser. No. 333,576 filed January 27, 1953, as a disclosure of the crystalline polypropylene of the count (JA-II:A851-900). Yet, nowhere in that fifty-page application is there any reference to polypropylene in terms of "crystalline" or "crystallinity".

The disclosure in the 1953 application upon which Phillips relies for its entitlement to the invention here at issue is a five-line description of its polymer made from propylene defined in properties of melting point, density, intrinsic viscosity and insolubility. The application states (JA-II:A851, A881-82):

> "The solid polymer fraction is insoluble in pentane at room temperature. The solid material has a melting point in the range of 240 to 300°F., a density in the range of 0.90 to 0.95, an intrinsic viscosity in the range of 0.2 to 1.0, and a weight average molecular weight in the range of approximately 5,000 to 20,000."

Phillips was unable to produce a single writing from its files, generated between 1951 when Phillips began its work on polypropylene and just prior to filing its January 11, 1956 application, which (i) described its polypropylene polymer as "crystalline" or having "crystallinity" or (ii) equated the above-defined properties with "crystalline" polypropylene or "crystallinity".

The record before the Board, in one of the largest interference proceedings held by the Patent Office, consisted of over 1,000 exhibits and 100 witnesses deposed in 18,000 pages of testimony (pp. 4a, 48a). This included evidence offered by Phillips regarding what experts understood from melting point, density, intrinsic viscosity and insolubility, including reinterpretation of earlier data obtained by Phillips personnel. After a painstaking analysis of this record, the Board denied Phillips the award of priority. The Board stated "[*t*]*here is no showing* . . . that in the 1952 period and immediately thereafter . . . [*Phillips*] *recognized at that time* that the material was crystalline" from either melting point or density determinations (p. 293a, Emphasis added).

The Board expressly found "no contemporaneous written record" that data regarding Phillips' polypropylene was interpreted as showing crystalline polypropylene. Indeed, it found that contemporaneous statements made by Phillips' analysts "militated against head-to-tail propylene consisting essentially of recurring propylene units" (pp. 294a-95a). The Board specifically commented that "No X-ray diffraction patterns were made at the time of the original work", thus emphasizing the criticality of contemporaneous recognition of crystallinity (p. 296a).[3]

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[3] In the relevant period, X-ray diffraction was the definitive method of identifying crystallinity. "High Polymers," *Physical Chemistry of High Polymeric Systems*, Mark and Tobolsky (1950) (p. 358), (JA-XIII:C1173); Concise Chemical and Technical Dictionary (1962) (p. 262), (JA-XXVII:F1587); Hackh's Chemical Dictionary (1944) (pp. 238, 913), (JA-XXVII:F1592-93).

Moreover, the Board specifically rejected "analytical work" and data reinterpretations done after the 1953 application was filed as being ineffective "to show what was in the mind of the original interpreter at a time contemporaneous with the preparation of the [data] . . . ." (pp. 295a-96a).

The Board noted that appreciation or recognition of crystallinity was triggered at Phillips only after learning of the work of others, stating (p. 278a):

> "It further appears that no investigation of the possible presence of crystalline polypropylene was undertaken until those at Phillips became aware of Natta's disclosure of isotactic (crystalline) polypropylene [in 1955] and it appeared that such a product would probably be the subject of a priority contest."

The Board's decision, emphasizing contemporaneous recognition and express disclosure, was in furtherance of the public policy that the application for a patent describe the invention in "full, clear, concise, and exact terms" (35 U.S.C. § 112). Having found that skilled workers in the art at Phillips failed to contemporaneously recognize and appreciate crystallinity from the properties of polypropylene disclosed in the Phillips 1953 application, the Board concluded that these properties were not a disclosure of the invention. The Board's decision was founded upon Court of Customs and Patent Appeals precedent that for invention there be a contemporaneous recognition and appreciation and a disclosure in compliance with 35 U.S.C. § 112. In contrast, the decisions of the district court and court of appeals discussed below are in conflict with the authorities from the Court of Customs and Patent Appeals and thwart this public policy.

2. The District Court's Decision

The district court reversed the award of priority to Montedison made by the Board and awarded the invention of crystalline polypropylene to Phillips based upon its January

1953 application. Notwithstanding (i) the absence of the words "crystalline" or "crystallinity" in that application, and (ii) the absence of those words in any contemporaneous Phillips documents describing its polypropylene, the court found the properties of density, melting point, intrinsic viscosity and insolubility were a disclosure that the Phillips polypropylene was crystalline. In so doing, the district court relied heavily upon testimony of an expert (Dr. Fox) given at trial in 1977, 24 years after the application was filed. Dr. Fox concluded that density, melting point, intrinsic viscosity and insolubility disclosed in the 1953 application were a disclosure to skilled workers in 1953 of crystalline polypropylene (p. 151a). The district court credited Dr. Fox's 1977 understanding of these properties, while characterizing contrary contemporaneous (1953) observations by skilled workers in the art at Phillips as an "apparent rejection of what later turned out to be the product's correct structure" (p. 142a). Thus, the district court, contrary to a substantial body of law from the Court of Customs and Patent Appeals, permitted latter day reinterpretation of data (i) to be substituted for the contemporaneous contrary conclusions reached by the skilled workers in the polypropylene art at Phillips and (ii) to supply conclusions contemporaneously non-existent at Phillips.

The district court further supported its conclusions that the 1953 application was an inherent disclosure of the invention by relying upon experiments following processes disclosed in the application ("repetition experiments"). The experiments, which were done by others subsequent to the filing of the 1953 Phillips application, sometimes produced products having the density, intrinsic viscosity, or melting point disclosed in the Phillips application and at other times produced products which did not conform to these descriptions or which were not polypropylene. The district court found such experiments to support an inherent disclosure of crystalline polypropylene notwithstanding an overwhelming body of law of the Court of Customs and Patent Appeals to the effect that for

an inherent disclosure the result following the application disclosure must always and invariably be the same, *infra*, pp. 27-29.

3. Decision of the Court of Appeals

In reviewing the district court's judgment, the Court of Appeals for the Third Circuit, also held that the properties of density, intrinsic viscosity and melting point set forth in the Phillips 1953 application were an inherent disclosure of crystalline polypropylene having essentially recurring propylene units. In affirming the district court, the court of appeals relied on the same expert testimony by Dr. Fox, to the effect that these properties disclosed crystalline polypropylene to one of ordinary skill in the art in 1953 and thus satisfied the requirements of 35 U.S.C. § 112.

The court of appeals failed to deal with the fact that the Board of Patent Interferences had rejected similar expert testimony as to the meaning of those properties in 1953 to one of skill in the art in the face of (i) a lack of contemporaneous written recognition and appreciation by the skilled workers in the art at Phillips that their product was crystalline and (ii) the presence of contemporaneous conclusions by such workers which "militated" against the conclusion that their material consisted of recurring propylene units (pp. 278a, 294a-96a).

The court of appeals acknowledged that the properties in the 1953 application did not disclose crystallinity to the skilled workers at Phillips from 1951 to 1955. However, to justify its conclusion of disclosure based on Dr. Fox's testimony, the court of appeals stated "[t]he appropriate inquiry, however, is the understanding and appreciation of knowledgeable polymer chemists at that time, rather than only the appreciation of Phillips" (p. 24a). The knowledgeable polymer chemists in 1953, against whom disclosure should have been measured, included those skilled polymer chemists at Phillips, who were in the forefront of polymer chemistry. Yet, these skilled

workers did not conclude that a polypropylene having those properties was crystalline and consisted of recurring propylene units; rather, they concluded otherwise in contemporaneous writings, *infra* pp. 14-15. Contrary to decisions of the Court of Customs and Patent Appeals, the court of appeals permitted Dr. Fox's reinterpretation of 24 year old data to be substituted for contemporaneous conclusions at Phillips, which made no reference to crystallinity or to a polypropylene consisting "essentially of recurring propylene units".[4]

In its affirmation of the district court's decision, the court of appeals was also confronted with the problem created by the district court's finding of an inherent disclosure by reliance upon repetition experiments, many of which failed to produce the crystalline polypropylene at issue. The district court had ignored the law of inherency set forth by the Court of Appeals for the Third Circuit in *Stamicarbon N.V.* v. *Chemical Const. Corp.*, 544 F.2d 645, 652 (3d Cir. 1976). In that case, relying on authorities from the Court of Customs and Patent Appeals, the court stated that in order to establish an inherent disclosure "it is not sufficient that a person following the disclosure *might* obtain the result set forth in the count; it *must invariably happen*" (Emphasis added). The court of appeals sought to soften the district court's failure to properly apply the law of inherency by stating (p. 35a):

> "Under the circumstances of this case, where the use to which the repetition experiments was put re-

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[4] Ironically, unlike the skilled workers at Phillips in 1953, Dr. Fox gave his testimony involving understandings in 1953 against a background that he "wasn't especially interested in polypropylene at the time [the 1950's] so I don't recall the development of crystalline polypropylene in the '50's" (JA-III: B432). He admitted that making crystalline polypropylene was a sought after "goal" of polymer chemists and if "somebody achieved that and announced it clearly" that would be "an exciting event" (JA-III:B433-34). Yet, the workers at Phillips did not announce it clearly in the 1953 application and there was no excitement until Phillips learned in 1955 that Natta had made crystalline polypropylene.

> lated to the description in the application, we are unwilling to hold that the rule of 'invariability' set forth in *Stamicarbon* precludes admitting or crediting such evidence."

In so ruling, the Court of Appeals for the Third Circuit continued the error of the district court in considering only successful repetition experiments and ignoring those which produced products other than the invention. The court of appeals placed itself squarely in conflict with the Court of Customs and Patent Appeals which has repeatedly required adherence to the "invariability" rule, namely, that there is no inherent disclosure of an invention in a patent application unless one following the disclosure in the application *always* and *invariably* obtains the invention.

Reasons for Granting the Writ

The writ should be granted because the judgment of the Court of Appeals for the Third Circuit in this case thwarts the public policy of awarding an invention to the party who first recognizes and appreciates it has made the invention. This public policy is reflected in the patent law in 35 U.S.C. § 112, which requires that an application for a patent contain a description of the invention in "full, clear, concise and exact terms".

A limited exception to the section 112 description requirement has been judicially created where an invention is inherently disclosed in an application. Where, as in the instant case, the clear, concise and exact terms of "crystallinity" and "recurring propylene units" are indisputably missing, not only from the Phillips 1953 application, but from any writings by the skilled workers at Phillips until almost 1956, resort to the doctrine of inherent disclosure can be had only where, following the disclosure of the application, the invention is *always* and *invariably* produced. As discussed below, *infra* p. 23, this result was not

achieved in repetition experiments and Phillips did not meet the heavy burden necessary to establish an inherent disclosure as required by the Court of Customs and Patent Appeals.

The writ also should be granted because the judgment of the court of appeals in this case is in conflict with and contrary to the decisions of the Court of Customs and Patent Appeals which have (i) barred the use of latter day interpretations of earlier data in substitution for contemporaneous conclusions in determining whether an invention has been made and (ii) barred a finding of inherent disclosure where one following the description in an application does not always and invariably obtain the same result. In rejecting the use of latter day interpretations of earlier data, the Court of Customs and Patent Appeals seeks to advance the public policy that an invention be awarded only to the first party who has recognized and appreciated in its work the essential novelty of the invention, here the property of crystallinity. In barring a finding of inherent disclosure without "invariability", the Court of Customs and Patent Appeals adheres to the statutory requirement that the application disclosure be in full, clear, concise and exact terms except in extraordinary circumstances.

The need to resolve this conflict is critical to establishing whether and when an invention has been made. A description in an application cannot be said to be a disclosure of the invention when skilled workers in the art, familiar with the description of the material, did not contemporaneously recognize and appreciate the essential point of novelty from the disclosure. If a latter day expert's conclusion as to what one skilled in the art understood from the description can be substituted for contrary contemporaneous conclusions, there will be no definiteness in application disclosures and inventions will be awarded to those who did not first recognize and appreciate them.

If the disclosure is not clear and concise, an inherent disclosure should be found only if the result obtained by

following the application is always and invariably the same; without invariability, there is no disclosure of the invention sufficient to entitle one to be called inventor.

I. The Court of Appeals Judgment Conflicts with Decisions of the Court of Customs and Patent Appeals Holding That Latter Day Interpretations of Data Cannot Be Substituted for Contemporaneous Conclusions When Determining Whether an Invention Has Been Made.

Recognition and appreciation of the invention are necessary to an award of priority and there can be no invention without such. The recognition must be contemporaneous with the priority dates claimed. As stated in *Breen* v. *Henshaw*, 472 F.2d 1398, 1401 (C.C.P.A. 1973):

> "There must be *contemporaneous* recognition and appreciation of the invention represented by the counts. Langer v. Kaufman, 59 C.C.P.A. ——, 465 F.2d 915 175 USPQ 172 (1972); Heard v. Burton, 51 C.C.P.A. 1502, 333 F.2d 239, 142 USPQ 97 (1964)." (Emphasis added).

In determining whether Phillips made an invention, the Court of Appeals for the Third Circuit ignored the absence of *contemporaneous* recognition and appreciation at Phillips that the polypropylene disclosed in the January 1953 application was either crystalline or consisted of recurring propylene units. Instead the court resorted to the *conclusions of an expert given 24 years later* and substituted them for contrary contemporaneous conclusions of those skilled in the art at Phillips in 1953.

A. The evidence establishes that Phillips was unaware that its polypropylene was crystalline until after learning of the work of others in 1955

It is undisputed that between the time Phillips began its first series of experiments involving polypropylene in 1951

and until the fall of 1955, there is no reference in any Phillips document to the Phillips polypropylene (i) being crystalline or (ii) equating melting point, density, or intrinsic viscosity of any polypropylene materials made at Phillips with the existence of crystallinity or recurring propylene units.

Further, the Phillips documents, which reflect its conclusions as to the nature of the Phillips polypropylene products, describe them in terms which deny both the existence of recurring proplylene units and crystallinity. In their first writing describing their solid polypropylene, the Phillips inventors Hogan and Banks, stated that it had a "tacky latex-like nature" (JA-XI:C1). The only description of the nature of the product was that of "a gel"[5] with "branching and/or cross-linking" (JA-XI:C71) or a "highly branched molecule" (JA-XI:C107).

Nowlin, an analyst at Phillips, was aware of the testing done with Phillips polypropylene between 1951 and 1955 in respect of density, melting point, and intrinsic viscosity. He stated that he was unaware at the time he left Phillips in 1955 that the polypropylene material was crystalline or even what the nature of its structure was. Before the Board of Patent Interferences, he testified (JA-XIX:E188):

> "Q. Then, how did you know this was a crystalline material?
> A. I didn't know it was.
> Q. If you didn't know beforehand, how could you tell?
> A. I didn't know what the composition of it was when I left Phillips. I didn't know the structure. I didn't know just exactly what it was."

The Board of Patent Interferences made express reference to this testimony in concluding that Phillips had not

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[5] The description of a polypropylene polymer as a "gel" meant to skilled workers in the art at Phillips that it was a cross-linked material and therefore was not crystalline (JA-VII:B2427; XIX:E164-65).

recognized that it had made crystalline polypropylene in its disclosures of density, melting point and intrinsic viscosity set forth in the January 1953 application (pp. 290a-91a). Both the district court and the court of appeals failed to address this lack of contemporary recognition of crystallinity by Nowlin, one of the workers skilled in the art of polypropylene at Phillips.

Another principal Phillips analyst, Thornton, observed that the polypropylene "gel" was a "highly branched molecule" (JA-XI:C107). The district court characterized this contemporary conclusion as an "apparent rejection of what later turned out to be the product's correct structure", but ignored this rejection in awarding priority to Phillips (p. 142a). This is to be contrasted with (i) the finding of the Board of Patent Interferences that such contemporary conclusions by those at Phillips "militated against head-to-tail polypropylene consisting essentially of recurring propylene units" and (ii) the Board's rejection of testimony in 1965 that interpreted the material to be crystalline when there was "no contemporaneous written record to this effect" (pp. 294a-95a). Certainly, Fox's testimony, given 12 years later, fails even more to fill the need for a *contemporaneous* recognition and appreciation at Phillips, without which the invention was not made and could not be found to be disclosed in the 1953 application.

After its January 1953 application, the next writing by Phillips referring to polypropylene is the December, 1954 continuation-in-part application to its 1953 application (JA-II:A901-82).[6] This 80-page application also is devoid of any description of the disclosed polypropylene as "crystalline", or having "crystallinity". These terms were well recognized in the art to describe a particular ordered structure of molecules such as is found in the

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[6] By December 1954, Standard, Montedison and DuPont all had filed applications describing their polypropylenes as crystalline.

invention at issue.[7] This 1954 application is further evidence that Phillips, as late as December, 1954, still had no appreciation that any polypropylene it had made was crystalline.

In March 1955, Natta, the assignor of Montedison, published the fact that he had made a polypropylene which was crystalline. When this fact was brought to the attention of Dr. Reynolds, the assistant director of research at Phillips, who was fully familiar with the work of Hogan and Banks reflected in the Phillips 1953 application, he stated it was "indeed remarkable" that Natta had produced such material and that it was a "very basic and important development" (JA-XV:C2242-43). This statement is inconsistent with any conclusion that the Phillips polypropylene of Hogan and Banks was contemporaneously recognized or appreciated to be crystalline. Thereafter, requests were made at Phillips to reanalyze earlier Phillips products prepared by Hogan and Banks and others "to determine if there was a crystallinity component" (JA-V:B1674). Following this effort, in January, 1956, Phillips filed a continuation-in-part application to its January 1953 application which as noted *supra* p. 5 is replete with references to crystallinity. Every claim to a polymer contains the term "crystalline" and for the first time, Phillips states the object of the invention is to make a "crystalline" polymer. For the first time in any Phillips application specific examples for the production of crystalline polypropylene are set forth (JA-II:A984, A996-997).

The district court and the court of appeals chose to ignore the fact that there was no description of the Phillips polypropylene as being crystalline until the property of crystallinity was revealed to Phillips in 1955 from

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[7] For example, Hackh's Chemical Dictionary of 1944 referred to by the district court defines the terms "crystalline", "crystallization", "crystallize" and "crystallogram" (JA-XXVII:F1592-93).

the Natta publication. In contrast, the Board of Patent Interferences found that this derived appreciation established a lack of contemporaneous recognition at Phillips when it filed its January 1953 application (pp. 273a, 278a, 296a).

The district court, in disposing of the DuPont case, which failed to refer to the crystallinity of its material, stated (p. 92a):

> *"It is illogical to believe that anyone who discovered a new product and realized that its distinguishing feature was its crystalline nature would fail to record that realization.* More likely, Du Pont's scientists were unwilling, without the X-ray testing and further infrared analyses which they subsequently carried out to conclude that Baxter's product was crystalline." (Emphasis added)

This description of the DuPont case by the district court is devastatingly applicable to Phillips' lack of recognition and appreciation of crystallinity. Not only did Phillips fail to describe its product as crystalline until its X-ray analyses in late 1955, but it had earlier eliminated the possibility that its polypropylene consisted essentially of recurring propylene units. Instead, Phillips described its polypropylene in terms of a highly branched/cross-linked gel which militated against the existence of a polypropylene of the invention at issue.

B. The Third Circuit's rationale for its decision thwarts the requirement of the patent law that there be a contemporaneous recognition and appreciation of an invention and a description of it in full, clear, concise and exact terms.

Faced with Phillips massive failure to record any appreciation or recognition of crystallinity, the district court and the court of appeals resorted to expert testimony, given almost 25 years after the application was filed, to the effect that certain disclosures of density, intrinsic viscosity, melt-

ing point and insolubility informed "one skilled in the art" at the time the work was done that the Phillips polypropylene was crystalline. Such a substitution of expert testimony, providing latter day interpretations (i) non-existent at the time disclosures were made and (ii) contrary to the interpretations of those skilled in the art at Phillips at the time the disclosures were made, is at variance with the patent law requirement of contemporaneous recognition and appreciation necessary to establish that an invention was made. It is further at variance with the requirement of 35 U.S.C. § 112 that the application for a patent contain a description of the invention to any person skilled in the art in "full, clear, concise and exact terms". In furtherance of these requirements of the patent laws, the Court of Customs and Patent Appeals has a policy rejecting the use of latter day testimony of an expert in substitution for the contemporaneous conclusions of skilled workers in the art who actually worked with the materials at issue. A *now* hypothetical understanding and latter day interpretation cannot be substituted for the conclusions *then* held by skilled workers who dealt with the materials at issue.

In *Spero* v. *Ringold*, 377 F.2d 652 (1967), the Court of Customs and Patent Appeals rejected testimony of a latter day expert which was offered as a substitute for contemporaneous statements of those skilled in the art which denied the identity of a specific chemical compound formed in a described process. Although the contemporaneous workers knew a certain steroid compound could be in either an alpha or beta configuration, they admitted they could not distinguish which configuration had been synthesized in their experiments. The Court of Customs and Patent Appeals denied a constructive reduction to practice based on latter day expert testimony to the effect that such expert could have predicted the configuration of the synthesized steroid compound.[8]

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[8] The Court of Customs and Patent Appeals did allow Spero to establish a constructive reduction to practice based on in-

(footnote continued on following page)

In *Spero*, Dr. Berneis, a co-worker of Spero's, testified that he did not distinguish the configuration of some of the steroid compounds which were the subject of the application "because the people at the Upjohn Company [assignee of Spero] did not know the steric configuration of those compounds at the time when Spero's first application was prepared and filed" (377 F.2d at 655). Berneis' testimony is very similar to (i) the conclusions of Nowlin, who admitted that he did not know the structure of the Phillips polypropylene at the time he left Phillips in 1955 and (ii) the erroneous conclusions in Thornton's 1952 report that the structure was a highly branched molecule. In *Spero*, in order to overcome the candid admission of ignorance by Dr. Berneis, Upjohn called Dr. Jensen as an expert. Dr. Jensen testified (in a manner very similar to Dr. Fox) that based upon publications bearing dates earlier than the publication date of the first application "a skilled organic chemist would predict" the steric structure of the compounds (377 F.2d at 655).

The *Spero* court *rejected this evidence* because Dr. Berneis, a man of ordinary skill in the art at Upjohn (like Nowlin and Thornton at Phillips) at the time the invention was made, admitted that he did not know the configuration of the product. The situation at Phillips is parallel to that at Upjohn as shown by the following statement (377 F.2d at 657):

> "We are not inclined to accord controlling weight to Professor Jensen's testimony in view of Dr. Berneis' conclusion that appellant was not sure 'which exact compound he would get' from the method of synthesis disclosed in some of the examples. *Thus it appears that*

(footnote continued from preceding page)

herency only after Spero proved from repetition experiments that the alpha configuration was "*always* present in the end product regardless of the starting material employed" (377 F.2d at 657, Emphasis added). This aspect of *Spero* is discussed below in connection with the Court of Customs and Patent Appeals requirement of invariability, *infra*, pp. 25-26.

> *appellant himself, presumably a man of ordinary skill in the art, did not know at the time of the preparation of Exhibit 4 the exact configuration of his product.* Dr. Jensen's testimony to the effect that one skilled in the art could predict the steric configuration of the product of appellant's Example 13 does not overcome the effect of the concession made by Dr. Berneis. Cf. Abington Textile Machinery Works v. Carding Specialists (Canada) Ltd. 249 F. Supp. 823, 829 (D.D.C. 1965)." (Emphasis added)

In *Silvestri* v. *Grant*, 496 F.2d 593, 598 (C.C.P.A. 1974), the court stated that the use of after-the-fact expert testimony was not permitted to establish earlier appreciation of the stated elements of the invention at issue in that case. The Court of Customs and Patent Appeals has been repeatedly reluctant to look favorably upon after-the-fact testimony which was at variance with contemporaneous reports. In *Hess* v. *Bland*, 347 F.2d 835, 841 (C.C.P.A. 1965), the Court stated:

> "It is clear that the witnesses generally took a more optimistic view of the test results in their testimony in 1962 than their statements and actions reported contemporaneously with the tests would appear to warrant. Under those circumstances, we are inclined to place greater weight on the contemporaneous reports and action."

To the same effect is *Breen* v. *Henshaw*, 472 F.2d 1398, 1401 (C.C.P.A. 1973), where the Court rejected later prepared evidence of the inventors (affidavits and later filed applications) presented in an attempt to explain away earlier contrary conclusions which were inconsistent with contemporaneous recognition.

For almost three years, from January 27, 1953, when Phillips filed its first application, until shortly before January 11, 1956, when it filed the application upon which it participated in Interference 89,634, Phillips did not describe its polypropylene as being crystalline. This is

evidence that the first application was not a constructive reduction to practice. *Eastman Kodak Co.* v. *E.I. duPont de Nemours & Co.*, 298 F. Supp. 718, 730 (E.D. Tenn. 1969). In that case, the court, relying upon precedent of the Court of Customs and Patent Appeals, stated:

> "When an alleged inventor files a first application which lacks a disclosure of the invention and subsequently filed a later application which does disclose the invention, it may be concluded that the alleged inventor had not conceived or reduced the invention to practice at the time the first application was filed. In Clark v. Camras, 204 F.2d 273, at 280, 40 CCPA (1953), the Court stated:
>
> > '* * * the involved invention solved an apparently serious problem confronting the art, yet we are unable to find in either of these Camras patents any hint of the problem here solved, or how to solve it. If the combined erase-record heads disclosed in these two Camras patents (upon which heads he seeks to predicate priority) had embodied the invention of the issue counts, *it is inconceivable to us that Camras would not have disclosed it in the applications for these patents had he in fact conceived the involved invention and reduced it to practice at that time.*' " (Emphasis added)

Of equal significance in *Kodak*, the inventor "did not appreciate" the patentable property of the invention "until he saw DuPont had so used it" (298 F. Supp. at 731). Similarly, Phillips had no appreciation of crystalline polypropylene until being made aware of Natta's work.

It is clear from the Phillips 1953 application and all surrounding documentation at Phillips that the properties of melting point, density, intrinsic viscosity, and insolubility did not disclose to the Phillips workers skilled in the art that the Phillips polypropylene was crystalline and consisted essentially of recurring propylene units.

The contemporary descriptions of the product describe it as a highly branched or cross-linked molecule, which is inconsistent with a crystalline polypropylene and one consisting essentially of recurring propylene units. Thus, the description in the application was not a disclosure of the invention in compliance with 35 U.S.C. § 112, which requires that "the necessary and only reasonable construction" to be given to such disclosure by those skilled in the art (i.e. those at Phillips) lend "clear support to each positive limitation" of the claimed invention. *Binstead* v. *Littmann,* 242 F.2d 766, 770 (C.C.P.A. 1957); *Wagoner* v. *Barger,* 463 F.2d 1377, 1379-80 (C.C.P.A. 1972); and *Langer* v. *Kaufman,* 465 F.2d 915, 918 (C.C. P.A. 1972).

Phillips appreciated it had made crystalline polypropylene only after learning of the work of others. Phillips' lack of contemporaneous appreciation is not invention. In *General Tire & Rubber Co.* v. *Jefferson Chemical Co Inc.,* 497 F.2d 1283, 1291 (2d Cir. 1974), the Court stated:

> "But just as 'accidental results, not intended and not appreciated, do not constitute anticipation' Eibel Process Co. v. Minnesota & Ontario Paper Co., 261 U.S. 45, 66, 43 S. Ct. 322, 67 L. Ed. 523 (1923), *so an unappreciated result* of a structurally obvious modification cannot itself constitute invention. While Heiss may have noted the superior water-resistant properties afforded by using propylene rather than ethylene oxide as a condensant, *he revealed no appreciation of the importance of this until the publication of the Price patent* . . . . [E]ven if . . . the claims . . . would be patentable because of the disclosure of the additional properties in compositions derived from propylene oxide condensates, *then as to that claimed invention, Heiss 'did not himself invent the subject matter sought to be patented'* 35 U.S.C. § 102(f); Contrast In re Zenitz, 333 F.2d 924, 52 CCPA 746 (1964)." (Emphasis added)

The testimony of an expert 24 years after the fact cannot provide the recognition and appreciation necessary for invention which was lacking at Phillips in 1953. Such testimony in 1977 cannot be used to make properties of a material set forth in a 1953 application a disclosure of crystalline polypropylene, when those properties did not disclose crystalline polypropylene to the workers skilled in the art at Phillips in 1953. The Third Circuit's use of that latter day reinterpretation of contemporary data places it squarely in conflict with the Court of Customs and Patent Appeals and the public policy of the patent laws.

II. The Court of Appeals Judgment Finding an Inherent Disclosure by Reliance upon After the Fact Repetition Experiments Which Did Not Always and Invariably Produce the Crystalline Polypropylene of the Invention Conflicts with Decisions of the Court of Customs and Patent Appeals Requiring Invariability for Inherent Disclosure.

The district court found an inherent disclosure of crystalline polypropylene based upon a series of repetition experiments, only some of which were successful in producing crystalline polypropylene. In discussing the repetition experiments upon which the district court relied, the court of appeals acknowledges that in many of those experiments the parties repeating the Phillips disclosure did not produce the crystalline polypropylene, which is the invention at issue (pp. 32a, 34a-35a).[9]

Having admitted that one following the disclosure of the Phillips 1953 application does not always and invariably obtain the invention at issue, the court of appeals was faced with a quandary. Just five years earlier in

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[9] Phillips expert Bailey testifying regarding these repetitions could give no reason why the failures occurred. Bailey admitted there were as many failures as successes (JA-IV:B980-84, B995, B999-1010, B1013-15; V:B1193-94, B1208-09, B1213-20, B1222).

Stamicarbon N.V. v. *Chemical Constr. Corp.*, 544 F.2d 645 (1976), the Court of Appeals for the Third Circuit was asked to find an inherent disclosure of an invention in a patent application, so that the application could be relied upon as a constructive reduction to practice. In that case, the court stated (544 F.2d at 652):

> "The law of inherency has been previously rehearsed. As those cases indicate, inherency 'may not be established by probabilities or possibilities.' *Hansgirg* v. *Kemmer*, 102 F.2d 212, 214 (Cust. & Pat. App. 1939). It 'is not sufficient that a person following the disclosure might obtain the result set forth in the count; it must invariably happen.' *Gubelmann* v. *Gang*, 408 F.2d 758, 766 (Cust. & Pat. App. 1969). Furthermore, in determining whether Bongard has disclosed the Mavrovic process, we may not, as Stamicarbon urges, focus only on figure 3. Rather, we must examine Bongard's disclosure 'in its entirety,' including the inconsistent figure 4. *Dyer* v. *Field*, 368 F.2d 466, 472, 55 CCPA 771 (1967). See *McAninch* v. *O'Brien*, 443 F.2d 1403, 1407, 58 CCPA 1333 (1971)."

The *Stamicarbon* decision relied entirely upon decisions of the Court of Customs and Patent Appeals for the requirement of "invariability" in order to support a finding of inherency.

Without citing any authority for its proposition, the court of appeals refused to follow the "invariability" rule of *Stamicarbon* and of the Court of Customs and Patent Appeals when considering repetition experiments as evidence of inherency. The court of appeals simply concluded that "[e]vidence of failure goes to the weight of the evidence" (p. 34a). It then made an exception to the invariability rule which has no support in any previous inherency decision stating (p. 35a):

> Under the circumstances of this case, where the use to which the repetition experiments was put related to

> the description in the application, we are unwilling to hold that the rule of 'invariability' set forth in *Stamicarbon* precludes admitting or crediting such evidence."

There is no authority which would permit ignoring repetitions which produce products other than the invention, while considering only "successful repetitions" in determining whether there is an inherent disclosure. The court of appeals disingenuously suggests that, in *Spero* v. *Ringold*, 377 F.2d 652 (C.C.P.A. 1967) and in *In re Nathan*, 328 F.2d 1005 (C.C.P.A. 1964), the Court of Customs and Patent Appeals found inherency even though there may possibly have been unsuccesful experiments. An analysis of the record of those cases before the Court of Customs and Patent Appeals shows, unlike the instant case, only repetitions which were *always* successful in obtaining the product at issue.

As noted *supra* pp. 18-20, in *Spero* v. *Ringold*, the Court of Customs and Patent Appeals rejected testimony of a latter day expert as to what was disclosed to one skilled in the art by the application at issue, where that testimony was at variance with earlier contemporaneous conclusions of skilled workers in the art working with the subject matter of the application. The Court of Customs and Patent Appeals did, however, find that there was an inherent disclosure because two sets of successful repetition experiments showed an inherent production of the invention at issue. Referring to these successful repetitions, the Court of Appeals for the Third Circuit asserts that the *Spero* court "stated that the testimony showed that the compound was always present in the end product but there was no discussion whether this conclusion was reached from invariably successful sets of experiments" (p. 34a). The court of appeals suggests that because there was no discussion of unsuccessful experiments, there may have been some and the Court of Customs and Patent Appeals would nonetheless have found there to have been an inherent disclosure. There is no basis for such conclusion. The testi-

mony regarding the repetition experiments taken in the *Spero* interference proceeding was described as follows (377 F.2d at 657):

> "[T]he testimony of one Lincoln, a research chemist in Upjohn's employ, who stated that when Examples 12 and 13 are practiced with either 6*a*-methyl progesterone or 6*b*-methyl progesterone starting materials, *the product obtained always contains 6a-methyl-17a-hydroxy-progesterone;* . . .
>
> • • •
>
> Turning now to the testimony of Lincoln, we believe appellant's contention with respect thereto has substantial merit. Lincoln testified that he performed or had carried out under Spero's direction two sets of experiments, both following the procedure of Examples 12 and 13. Lincoln used 6*a*-methyl progesterone as the starting material in one experiment and 6*b*-methyl progesterone in the other. *The testimony shows that 6a-methyl-17a-hydroxy-progesterone is always present in the end product regardless of the starting material employed.*" (Emphasis added)

In *Spero* the conclusion of inherent disclosure was based on repetition experiments that *always* produced the material which was the invention at issue. Clearly, there were no unsuccessful experiments.

Similarly, in *In re Nathan, supra,* the Court of Customs and Patent Appeals relied upon an affidavit which referred to reproductions of the application to establish inherent disclosure of the invention at issue. The Court of Appeals for the Third Circuit suggests that there was no discussion in the affidavit of "possible unsuccessful results" (p. 34a). That suggestion is clearly without support because the affidavit in *Nathan* expressly stated "moreover, we are unaware of any facts inconsistent therewith" (328 F.2d at 1007). Such a statement could not have been made had there been unsuccessful experiments.

From the foregoing analysis of *Spero* and *Nathan*, it is seen that where repetition experiments are relied upon to support an inherent disclosure, the Court of Customs and Patent Appeals does not depart from its invariability rule. In fact that court has made it clear in a number of cases that successful experiments in which one *may* achieve the invention at issue when operating somewhere within the disclosure are not sufficient to establish inherent disclosure. *Crome* v. *Morrogh*, 239 F.2d 390 (C.C. P.A. 1956), held that if the resultant product following the disclosure of the application is not necessarily and always the invention, there is a failure of proof necessary for an inheernt disclosure. The court stated (239 F.2d at 392):

> "The lack of express disclosure is not necessarily fatal to Crome's right to make the counts, since such right may be based upon inherent disclosure. However, as we pointed out in Brand v. Thomas, 96 F.2d 301, 25 C.C.P.A., Patents, 1053, it is not sufficient that a person practicing the invention disclosed in the application might obtain the result set forth in the counts. Accordingly, in order to support a holding that Crome is entitled to make the counts in issue, it would be necessary to find that, if the procedure disclosed in his application is followed the resultant product will necessarily satisfy the requirements of the copied claims as to cerium and sulphur content. It would not be sufficient to show that it is possible to obtain such a product by working within the ranges given in his application."

The Court of Customs and Patent Appeals in *Wagoner* v. *Barger* 463 F.2d 1377, 1380 (C.C.P.A. 1972) described the burden of proving inherency as "a heavy one". The court stated (463 F.2d at 1381):

> ". . . the burden should have been placed on Barger to prove that one skilled in the art would necessarily obtain extrusion of film 'at a temperature not over about

> 210°F.' employing any combination of the variables set forth in Barger's parent—or, in other words, not simply that one skilled in the art *might* come within the scope of the count in following the teachings of the parent application but that he *necessarily* would." (Emphasis original)

The evidence before the court of appeals clearly established that in repetition experiments following the Phillips application employing many combinations of the variables set forth in that application, the product was not necessarily crystalline polypropylene, the invention at issue. In *Wagoner*, even though the experiments were successful, they were not sufficient to support Barger's contention that they proved an inherent disclosure. The court stated (463 F.2d at 1382):

> "Barger's evidence concerning the experiments allegedly conducted by Barger is, at best, evidence that it is *possible* to obtain film meeting the controversial limitation while operating somewhere *within* the ranges set forth in their parent application, because Barger did so." (Emphasis original)

The Court of Customs and Patent Appeals and the Board of Patent Interferences have uniformly held that to support an inherent disclosure it is not sufficient that a person following the disclosure might obtain the result set forth in the count; it must invariably happen. See, for example, *Noyce* v. *Kilby*, 416 F.2d 1391, 1396 (C.C.P.A. 1969); *Gubelmann* v. *Gang*, 408 F.2d 758, 766 (C.C.P.A. 1969); *Crome* v. *Morrogh*, 239 F.2d 390, 391-92 (C.C.P.A. 1956); *Paine* v. *Inoue*, 195 U.S.P.Q. 598, 602 (Bd. Pat. Int. 1976); *Natta and Crespi* v. *Payne*, 165 U.S.P.Q. 466, 470 (Bd. Pat. Int. 1970); and *Buddemeyer and Moneymaker* v. *Thomas*, 177 U.S.P.Q. 81, 83-84 (Bd. Pat. Int. 1972).

A departure from the invariability rule will destroy the requirement that a disclosure serve as a teaching of the invention. It is accepted by the court of appeals that when

one repeats the disclosure of the Phillips 1953 application, one obtains products which sometimes are, and sometimes are not, the crystalline polypropylene of the invention. The decision of the Court of Appeals for the Third Circuit awarding Phillips priority based on such disclosure places itself squarely in conflct with decisions of the Court of Customs and Patent Appeals on the inherency issue. If inherency does not require "invariability", there will be a lack of definiteness (i) in priority contests in ascertaining whether there is an inherent disclosure of an invention in an application for a patent and (ii) in validity contests in ascertaining whether there is an inherent disclosure in earlier patents which bars from patentability the work of subsequent experimenters.

CONCLUSION

For the reasons stated, this petition for a writ of certiorari should be granted.

Dated: January 12, 1982

Respectfully submitted,

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Appendix

81-1303

No.

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IN THE

Supreme Court of the United States

OCTOBER TERM, 1981

STANDARD OIL COMPANY (INDIANA), a corporation of Indiana,

Petitioner,

v.

PHILLIPS PETROLEUM COMPANY, a corporation of Delaware.

APPENDIX TO PETITION FOR A WRIT OF CERTIORARI TO THE UNITED STATES COURT OF APPEALS FOR THE THIRD CIRCUIT

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APPENDIX A

Opinion of the Court of Appeals.

UNITED STATES COURT OF APPEALS
FOR THE THIRD CIRCUIT

Nos. 80-1553, 80-1554, 80-1555

STANDARD OIL COMPANY (INDIANA)

v.

MONTEDISON, S.p.A., a corporation of Italy, PHILLIPS PETROLEUM COMPANY, a corporation of Delaware, and E.I. du PONT de NEMOURS and COMPANY, a corporation of Delaware,

STANDARD OIL COMPANY (INDIANA),
Appellant No. 80-1553

E. I. du PONT de NEMOURS and COMPANY,
Appellant No. 80-1554

MONTEDISON, S.p.A.,
Appellant No. 80-1555

ON APPEAL FROM THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF DELAWARE

(Consolidated Civil Action No. 4319)

Argued April 23, 1981

Before: HUNTER, SLOVITER, *Circuit Judges* and MEANOR, *District Judge**

(Opinion filed October 14, 1981)

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* Honorable H. Curtis Meanor, United States District Judge for the District of New Jersey, sitting by designation.

Appendix A

Opinion of the Court

Sloviter, *Circuit Judge.*

I.

Background

At issue in this case is the priority of invention of crystalline polypropylene, a plastic with considerable commercial utility and value. Among other attributes, crystalline polypropylene has a significantly higher melting point, tensile strength and heat resistance than prior products in the field. The antagonists, each claiming priority of invention of crystalline polypropylene for its assignor or assignors are Phillips Petroleum Company (Phillips), Montedison, S.p.A. (Montedison),[1] E. I. du Pont de Nemours & Company (Du Pont) and Standard Oil Company of Indiana (Standard).

Following protracted litigation in the United States Patent Office,[2] the Board of Patent Interferences of the

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[1] Montedison is a corporation of Italy having its principal place of business in Milan, Italy. In the Patent Office phase of this litigation, the corporation was first known as Montecatini Societa Generale per L'Industria Mineraria e Chimica, then as Montecatini Edison, S.p.A. In the district court, a change of name to Montedison, S.p.A. was effected by stipulation of the parties and order of the court dated April 25, 1975.

[2] Between 1953 and 1956, Montedison, Du Pont, Standard and Phillips, as well as Hercules Powder Company (Hercules), separately filed in the United States Patent Office, in the name of the individual scientists responsible for the work performed for the corporations, one or more applications for a United States patent claiming the invention of a new solid polypropylene. In 1957 a Patent Office examiner determined that the following applications supported a common patentable solid polypropylene:

Application Ser. No. 462,480, filed October 15, 1954, by Alex Zletz, assigned to Standard;

(footnote continued on following page)

Appendix A

United States Patent Office (Board)[3] concluded that the Natta group Montedison's assignors, were the first in-

[3] The name of the Office was changed to the Patent and Trademark Office by Act of January 2, 1975, Pub. L. 93-596, 88 Stat. 1949, amending title 35 of the United States Code. Since most of the events relevant to this case occurred in the period when the Office was called the Patent Office, that designation is used here.

(footnote continued from preceding page)

Application Ser. No. 514,099, filed June 8, 1955, by Natta et al., assigned to Montedison;

Application Ser. No. 523,621, filed July 21, 1955, by Vandenberg, assigned to Hercules;

Application Ser. No. 556,548, filed December 30, 1955, by Baxter et al., assigned to Du Pont;

Application Ser. No. 558,530, filed January 11, 1956, by Hogan et al., assigned to Phillips.

On the basis of these applications, on September 9, 1958 the examiner, pursuant to 35 U.S.C. § 135, declared Interference No. 89,634, thereby suspending the applicants' *ex parte* prosecution of their claims to the invention of the new polypropylene until the Board of Patent Interferences adjudged which applicant was the first inventor entitled to the issuance of a patent. In addition, pursuant to 35 U.S.C. §§ 119 and 120, the examiner accorded the benefit of the filing date of earlier filed applications for United States or foreign patents to the inventors as follows:

Italian Application No. 24,227, filed June 8, 1954, by Natta et al., assigned to Montedison;

United States Application Ser. No. 451,064, filed August 19, 1954, by Baxter et al., assigned to Du Pont;

United States Application Ser. No. 500,041, filed April 7, 1955, by Vandenberg, assigned to Hercules;

Because the Natta group's Italian application was the earliest filed of the applications accepted by the examiner as supporting the new invention, under Patent Office Rule of Practice 257, promulgated at 37 C.F.R. § 1.257, Natta et al. became senior parties in the interference proceeding, which imposed on the junior parties the burden to prove a date of invention earlier than June 8, 1954, the date of the Natta application for an Italian patent.

(footnote continued on following page)

ventors and granted invention dates to the parties as follows:

> Montedison: June 8, 1954, based on the date of the filing of the Natta et al. Italian Application No. 24,227;
>
> Du Pont: August 19, 1954, based on the date of the filing of the Baxter et al. United States Application Ser. No. 451,064;
>
> Standard: October 15, 1954, based on the date of the filing of Zletz's United States Application Ser. No. 462,480;
>
> Phillips: January 11, 1956, based on the date of the filing of the Hogan et al. United States Application Ser. No. 558,530.

Thereafter, Montedison resumed *ex parte* prosecution in the Patent Office of the Natta group's claim to the invention of crystalline polypropylene in Application Ser. No.

(footnote continued from preceding page)

On October 6, 1964, the Board terminated the proceedings as to Vandenberg and his assignee Hercules because they could not allege a date of invention prior to the date on which Zletz filed his application. *See Vandenberg v. E. I. du Pont De Nemours & Co.*, 242 F. Supp. 188, 189 (D.D.C. 1965). The remaining contending parties engaged in extensive discovery proceedings, necessitating various judicial determinations. *See, e.g., Natta v. Zletz*, 418 F. 2d 633 (7th Cir. 1969); *In re Natta*, 410 F.2d 187 (3d Cir.), *cert. denied*, 396 U.S. 836 (1969); *Natta v. Zletz*, 405 F.2d 99 (7th Cir. 1968); *Natta v. Hogan*, 392 F.2d 686 (10th Cir. 1968); *In re Natta*,, 388 F.2d 215 (3d Cir. 1968), *overruled, Frilette v. Kimberlin*, 508 F.2d 205 (3d Cir. 1974) (en banc), *cert. denied*, 421 U.S. 980 (1975); *Natta v. Zletz*, 379 F.2d 615 (7th Cir. 1967). The extensive record before the Board was finally completed in April 1970. Over 1,000 exhibits had been submitted and over 100 witnesses deposed in 18,000 pages of testimony. The Board heard oral argument at a final hearing on October 28 and 29, 1970 and issued its decision on November 29, 1971.

514,099; on February 6, 1973, United States Patent No. 3,715,344 covering the invention was issued to Natta et al.

Each of the unsuccessful parties to the interference proceeding in the Patent Office filed civil actions in January 1972, pursuant to 35 U.S.C. § 146, challenging the Board's decision.[4] The actions, which were evetually consolidated for all purposes, were assigned to Judge Caleb M. Wright.[5] They were then stayed pending resolution of earlier-filed patent infringement suits before the same judge arising out of a different patent owned by Montedison which covered a form of crystalline polypropylene not at issue here. That litigation was settled in March 1975. Thereafter, plaintiffs in this action sought to amend their complaints to make additional allegations against Montedison including charges of fraudulent activities in the Patent Office in the prosecution of the Natta group's patent application. The denial of permission to amend was reversed by this court which held that in appropriate circumstances the district court may, in the exercise of a sound discretion, hear issues of fraud affecting the Board's decision on priority although such issues were not raised in the interference proceeding. *Standard Oil Co. v. Montedison, S.p.A.*, 540 F.2d 611 (3d Cir. 1976). On remand, the district court permitted the amendment of the complaints to add claims that Montedison committed fraud on the Patent Office affect-

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[4] The three unsuccessful parties filed duplicative actions in the District of Columbia and the District of Delaware. Standard's District of Columbia action was transferred to Delaware and the other two District of Columbia actions were dismissed.

[5] Judge Wright, who handled these cases throughout the lengthy district court proceedings, was Chief Judge of the United States District Court for the District of Delaware at the time of the assignment and took senior judge status on October 8, 1973.

ing the Board's decision on priority. *Standard Oil Co. v. Montedison, S.p.A.*, 431 F. Supp. 1064 (D. Del. 1977). The consolidated cases then advanced to trial of the issues.

During the course of the 85-day trial conducted between September 19, 1977 and May 17, 1978, the district court received, in addition to the voluminous record compiled in the Patent Office, considerable new evidence including several thousand exhibits and the testimony of a number of experts in the area of physical and polymer chemistry. On January 11, 1980, the district court issued a detailed opinion which it supplemented on February 28, 1980 when it entered the order which is the subject of this appeal. *Standard Oil Co. v. Montedison, S.p.A.*, 494 F. Supp. 370 (D. Del. 1980).

The court affirmed the Board's determination of the dates of invention for Montedison, Standard and DuPont but concluded that Phillips was entitled to an invention date of no later than January 27, 1953. Thus the invention dates awarded by the district court were:

Phillips: January 27, 1953

Montedison: June 8, 1954

DuPont: August 19, 1954

Standard: October 15, 1954

The district court also determined that Phillips had proved that Montedison fraudulently withheld information from Patent Office examiners, and that this fraud was detrimental to Phillips' case for priority of invention in the Patent Office. It held therefore that Phillips' burden of proof, which would ordinarily require it to adduce clear and convincing evidence to overcome the Board's findings regarding the priority date, was reduced to a preponderance of evidence standard. 494 F. Supp. at 375-76. The court concluded, nonetheless, that Phillips

had in fact proven its case by clear and convincing evidence. 494 F. Supp. at 435. Finally, the district court *sua sponte* reached the isssue of the patentability of Phillips' product and found that the crystalline polypropylene of the interference count was useful, novel and non-obvious, and therefore patentable to Phillips. 494 F. Supp. at 454-456, reaffirmed at 456-61. The court's judgment, entered February 28, 1980, authorized the Commissioner of Patents and Trademarks to issue letters patent to Hogen et al. and their assignee, Phillips.

II.

Issue

None of the appellants claim an invention date earlier than January 27, 1953, the priority date the district court accorded to Phillips. Therefore, although each company vigorously asserts its own position and priority, our preliminary inquiry must be directed to the court's determination of Phillips' invention date. If that is sustained, we need not reach any of the other issues raised on appeal.

The district court found that Phillips was entitled to priority on either of two bases: (1) constructive reduction of the invention of crystalline polypropylene to practice by the filing of an application for a United States patent on January 27, 1953, or (2) actual reduction of the invention to practice by the Hogan group in 1951-1952. There is some variation in the challenges of the three appellants to the district court's conclusions, but considered together they argue that the court's determination as to actual reduction to practice by Phillips was erroneous because Phillips failed to prove by admissible evidence the utility required by the law for the four products Phillips produced in 1951-52 which it relies upon for actual reduction to practice. They also contend that the

district court erred in finding that in 1951-52 Phillips recognized those four products as the invention.

The appellants further contend that the district court erred in concluding that Phillips was entitled to a constructive reduction date of January 27, 1953 based on the application filed in the Patent Office by Hogan et al. on that date. They argue that the Phillips 1953 application does not contain an adequate disclosure of utility and that it does not either describe the invention of the interference count in the language of the count or inherently disclose the invention in equivalent language. They also contend that the invention claimed in 1953 application is not the invention of the count, and that it is not the crystalline polypropylene claimed in the Hogan group's Application Ser. No. 558,530, filed January 11, 1956, which was the basis on which those inventors became parties to Interference No. 89,634. The appellants also challenge various of the district court's ruling on the fraud issues, and Montedison argues that the district court erred in deciding patentability as to Phillips.

After reviewing the record and considering all of the appellants' contentions, we conclude that the district court did not err in awarding priority to Phillips with respect to the invention of crystalline polypropylene based on an invention date of no later than January 27, 1953. Specifically, we affirm the district court's determination that Phillips constructively reduced the invention of crystalline polypropylene to practice on January 27, 1953, the date on which Phillips filed an application for a United States patent describing and claiming processes and products, including a novel solid polypropylene. We agree with the district court that that application, in compliance with the disclosure requirements of our patent laws, disclosed the crystalline polypropylene described in the count of Interference No. 89,634 and claimed in Phillips'

application filed January 11, 1956 and that the 1953 application contained the necessary utility disclosures with respect to crystalline polypropylene.

Because of our conclusion that Phillips is entitled to priority on the basis of its constructive reduction to practice, we do not reach the appellants' contention that the district court erred in finding that Phillips had earlier achieved an actual reduction to practice. Moreover, since we agree with the district court that Phillips met the clear and convincing burden of proof ordinarily imposed on a plaintiff challenging the Board's decision in an interference, the issue of Montedison's fraud would have no effect on Phillips' entitlement to priority and we do not reach it.

III.

An Overview of the Legal Principles

A.

Scope of Review

An action brought under 35 U.S.C. § 146 is a trial *de novo;* the statute provides that the Patent Office record shall be admitted in the district court proceeding "without prejudice to the right of the parties to take further testimony." *See Frilette v. Kimberlin,* 508 F.2d 205, 211 (3d Cir. 1974) (en banc), *cert. denied,* 421 U.S. 980 (1975); *Minnesota Mining & Manufacturing Co. v. Carborundum Co.,* 155 F.2d 746, 748 (3d Cir. 1946). Nevertheless, a section 146 proceeding is governed by the strict rule that the Board's decision on priority, a "question of fact," is not to be disturbed "unless the contrary is established by testimony which in character and amount carries thorough conviction." *Morgan v. Daniels,* 153 U.S. 120, 125 (1894);

Stamicarbon N.V. v. Chemical Construction Corp., 544 F.2d 645, 647 (3d Cir. 1976).

As to our review of the district court, it is plenary with respect to legal issues but subject to Federal Rule of Civil Procedure 52(a) on factual matters. *Stamicarbon, N.V. v. Chemical Construction Corp.*, 544 F.2d at 648. In this case, as one would expect, the appellants contend that this court should exercise plenary review of the decision of the district court. Phillips, on the other hand, argues that the trial courts findings should be reviewed in the same manner as in any other kind of law suit. While the proper construction of a patent application ultimately presents a legal issue. *Methode Electronics, Inc. v. Elco Corp.*, 385 F.2d 138, 140 (3d Cir. 1967); *Minnesota Mining & Manufacturing Co. v. Carborundum Co.*, 155 F.2d at 749, where the district court's decision on the adequacy of the disclosures of a patent application is based on an evaluation of expert testimony, it has been held that the decision presents a mixed question of law and fact. *Hinde v. Hot Sulphur Springs, Colorado*, 482 F.2d 829, 835 (10th Cir. 1973); *see Carter-Wallace, Inc. v. Otte*, 474 F.2d 529, 547 (2d Cir. 1972), *cert. denied*, 412 U.S. 929 (1973). The "clearly erroneous" standard of review under Rule 52(a) has been found to be particularly appropriate in cases, such as this, involving complex chemical patents. *See Ludlow Corp. v. Textile Rubber & Chemical Co.*, 636 F.2d 1057, 1060-61 (5th Cir. 1981); *see also Graver Tank & Manufacturing Co. v. Linde Air Products Co.*, 339 U.S. 605, 609-10 (1950).

Selection of the appropriate standard of review in a patent appeal may often depend on the particular circumstances of the case. When many of the key issues involve inherency, as they do here, one may argue that all that is involved is the construction of the patent application. However, when resolution of that issue requires

expert testimony because it is not susceptible to analysis by persons untrained in the intricacy of polymer chemistry, the trial court's findings do not differ in any material respect from findings in other types of cases of similar complexity. In this case, for example, the trial court had the opportunity to hear the experts testify and to observe their demeanor and response when under vigorous cross-examination; similarly, the trial court examined slides and other exhibits which were described or clarified by the experts. We believe, therefore, that under these circumstances the appropriate standard of review of all findings based in part on expert testimony should be reviewed under the "clearly erroneous" standard of Rule 52(a). Nonetheless, we have independently reviewed the record, including testimony and exhibits, and have concluded that even under a broader standard of review, the findings and conclusions of the district court should be affirmed.

B.

Priority

Generally, in determining entitlement to a patent when there are contending inventors, priority is awarded to the party who first reduced to practice a conception of the invention if all other conditions of patentability are satisfied. *See Rex Chainbelt, Inc. v. Borg-Warner Corp.*, 477 F.2d 481, 487 (7th Cir. 1973); *Grefco, Inc. v. Kewanee Industries, Inc.*, 499 F. Supp. 844, 848 (D. Del. 1980), *aff'd*, No. 80-2573 (3d Cir. Aug. 3, 1981); 3 Chisum, *Patents* § 10.01 (1981).[6] Reduction to practice may be

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[6] The major exception occurs when a party who was later in actual reduction to practice can nevertheless prove that s/he conceived the invention first and exercised reasonable diligence in re-

(footnote continued on following page)

established by a party either by reliance on the filing date of its application, which constitutes constructive reduction to practice, or by proof of actual reduction to practice on an earlier date. *See Kardulas v. Florida Machine Products Co.*, 438 F.2d 1118, 1120-22 (5th Cir. 1971); 35 U.S.C. § 102(g); 3 Chisum, *Patents* § 10.02.

Two statutory provisions stretch backward the date of constructive reduction of an invention to practice. Under section 120, 35 U.S.C. § 120, an applicant may rely not only on the filing date of the application in which the invention is claimed but on the filing date of a previously filed United States patent application if the earlier application satisfied the statutory disclosure requirements with respect to the invention subsequently claimed. It is this provision which enables Phillips to use the date of January 27, 1953 when its assignors, the Hogan group, filed Application Ser. No. 333,576.[7] The other relevant statutory provision, section 119, 35 U.S.C. § 119, gives an applicant the benefit of the filing date of an application for a foreign patent filed not more than one year before the filing of the counterpart United States application, also assuming adequate disclosure. *Yasuka Kawai v. Metlesics*, 480 F.2d 880, 886 (C.C.P.A. 1973). It was this

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(footnote continued from preceding page)

ducing that invention to practice. *See* Marconi Wireless Telegraph Co. of America v. United States, 320 U.S. 1, 34-35 (1943). The statute provides, "In determining priority of invention there shall be considered not only the respective dates of conception and reduction to practice of the invention, but also the reasonable diligence of one who was first to conceive and last to reduce to practice, from a time prior to conception by the other." 35 U.S.C. § 102(g).

[7] Although the Patent Office examiner rejected this application as unsupportive of the subject matter of the interference, he gave Phillips status as a party on the basis of a subsequent application by the same inventor group.

provision which enabled Montedison to rely upon the 1954 Italian application filed in the name of its assignors, the Natta group.

C.

Disclosure

Compliance with the full disclosure requirement of 35 U.S.C. § 112, which facilitates subsequent free public use of the invention, is the *quid pro quo* for the grant of a limited patent monopoly on a patentable invention. *In re Argoudelis,* 434 F.2d 1390, 1394 (C.C.P.A. 1970) (concurring opinion); 2 Chisum, *Patents* § 7.01 (1981). The requirement that a patent application must contain a full disclosure also serves to set forth clearly the scope and limits of the invention. In addition, the specification and claims of an application provide the evidence from which it can be ascertained whether the applicant was in actual possession of a particular invention on the filing date. For this reason, the disclosure requirement is considered equally applicable when a foreign application is sought as the invention date of a subsequently claimed invention, *Yasuko Kawai v. Metlesics,* 480 F.2d at 886, and when the date of a previously filed United States application is sought. *In re Smith,* 481 F.2d 910, 914 (C.C.P.A. 1973); 2 Chisum, *Patents* § 7.04.

Section 112 expressly provides that the specification of an application shall contain: a description of the invention, sufficient information to enable one skilled in the art to make and use the invention, and the best mode known to the applicant of carrying out the invention. 35 U.S.C. § 112. In addition, section 101 has been construed to impose the requirement of a practical utility disclosure. *Yasuko Kawai v. Metlesics,* 480 F.2d at 886; *see Brenner v. Manson,* 383 U.S. 519 (1966).

Appendix A

IV.

Inherency of the Disclosures

The invention described in the interference count at issue here is:

> Normally solid polypropylene, consisting essentially or recurring propylene units, having a substantial crystalline polypropylene content.

In their attack on the district court's finding that the Phillips 1953 application constituted a constructive reduction to practice of the invention described in the count, the appellants challenge the sufficiency of that application. Montedison and Du Pont challenge the utility disclosure. Montedison and Standard challenge the sufficiency of the invention description in two important respects. Although they concede that the 1953 application disclosed a solid polypropylene, they contend that it did not disclose a poiypropylene "consisting essentially of recurring proplylene units" or polypropylene "having a substantial crystalline polypropylene content."

A.

Sufficiency of Description

Turning first to the challenges made to the adequacy of Phillips' disclosure of the count invention, it is undisputed that Phillips' 1953 application does not contain either the language "consisting essentially of recurring propylene units," or the language "having a substantial crystalline polypropylene content." However, to satisfy the disclosure requirements of section 112, the description of the invention need not repeat the language of the count *in haec verba* but may be in any manner which adequately but necessarily communicates the invention of

the count to persons of ordinary skill in the art reading the application at the time of its filing. *Stamicarbon, N.V. v. Chemical Construction Corp.*, 544 F.2d at 652; *In re Wertheim*, 541 F.2d 257, 262 (C.C.P.A. 1976); *see Plastic Container Corp. v. Continental Plastics of Oklahoma, Inc.*, 607 F.2d 885, 896 (10th Cir. 1979), *cert. denied*, 444 U.S. 1018 (1980). The language of the application is deemed the legal equivalent of the language of the count if the necessary and only reasonable construction which can be given it is the same as the construction given the language of the count. *See Wagoner v. Barger*, 463 F.2d 1377, 1380 (C.C.P.A. 1972). The party who asserts inherent disclosure has the heavy burden of proving it. *Id.*

The 1953 patent application is entitled "Process for Polymerizing Olefins[8] and Catalyst Therefor." The principal feature of the inventions described and claimed in the application is the use of a "novel" catalyst, "chromum oxide deposited on . . . silica, alumina, or silica-alumina supports", in the polymerization of propylene and other olefins. The application states that the object of the polymerization reaction is to produce "novel tacky and solid polymers." Four products are produced by the new polymerization process: the total polymer; a liquid oily polymer fraction; the "tacky polymer" "the lower weight portion of the [remaining] semi-solid polymer which can be extracted therefrom, e.g. with n-C_5"; and the residue, a "solid polymer" which is "the higher molecular weight portion of the semi-solid fraction, which constitutes the raffinate or insoluble portion left from the extraction with n-C_5 or methylisobutylketone (MIBK)." Joint Appendix Vol. III, p. A854.

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[8] An olefin is a hydrocarbon in which there are twice as many hydrogen as carbon atoms and only one double bond. Joint Appendix Vol. III, pp. B247, B250.

Appendix A

The application then further describes the four products, *i.e.*, the total polymer and the liquid, tacky and solid fractions of it, obained by the new process:

> The polymerization of propylene over this catalyst yields a product of about 2000 to 3000 average molecular weight. The molecular weight of the polypropylene produced by the process of the invention in the presence of chromium oxide supported on silica, alumina, or silica-alumina ranges from about 200 to 50,000. Our polypropylene contains about 10 to 20 weight per cent material boiling below 900°F. This fraction is an oil having an initial boiling point of about 400°F. The fraction boiling above 900°F is described best as a tacky polymer containing both semi-solid and solid polymer. The tacky polymer is semi-solid polymer soluble in pentane at room temperature and may be extracted in this manner, leaving a solid polymer fraction which is insoluble in pentane at room temperature.

Id. This description of the products of the invention is followed by a statement of the utility of each, including the following:

> . . . The solid polymers and copolymers of the invention have utility in the applications where any of the solid plastics are used.

Id. at 855. The application then instructs as to the preparation of the catalyst and the preferred temperature, pressure and other conditions to be used in carrying out the polymerization reaction. Twenty examples are given to illustrate and clarify the invention. Finally, 33 processes for polymerizing olefins or manufacturing the

catalyst are claimed as well as 17 products, including polymers and catalysts. Claim 31 reads:

> A solid polypropylene made by the process of claim 22, having a melting point in the range of 240 to 300°F, a density in the range of 0.90 to 0.95, an intrinsic viscosity in the range of 0.2 to 1.0, and a weight average molecular weight in the range of 5,000 to 20,000.

Id., p. A890. It is this product which Phillips claims is the crystalline polypropylene of the interference count.

After examination of the application, consideration of the expert testimony produced by Phillips and consideration of the evidence that six independent research groups produced a product complying with Phillips' disclosures that always and inevitably conformed to the three limitations of the Count, the district court concluded "that Phillips's 1953 application disclosed crystalline polypropylene." 494 F. Supp. at 430.

1. *Polypropylene "consisting essentially of recurring propylene units."*

The object of polymerization[9] is to break the double bond joining the atomic groups constituting the molecular structure of the starting monomer, here, propylene, so that in the resulting polymer those groups are joined by a single bond and the released bond serves to form additional molecular units. Thus, a polymer contains a greater number of molecular units than its corresponding monomer. The district court graphically described and illustrated

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[9] References to "polymerization" throughout this opinion are to addition polymerization of unsaturated hydrocarbons as distinguished from condensation polymerization, not relevant here. Joint Appendix Vol. III, p. B246.

the polymerization process with respect to the monomer, propylene, in its opinion at 494 F. Supp. at 376.

One of the distinguishing characteristics of the polypropylene of the count is that it consists "essentially of recurring propylene units." As the district court explained:

> [T]he polymerization is very orderly, resulting in the production of a polypropylene consisting of recurring propylene units:

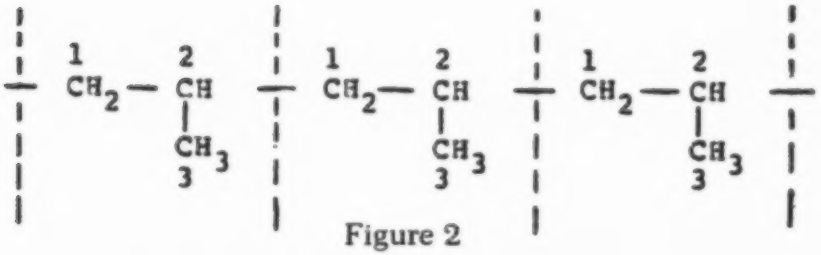


Figure 2

> This type of regular polymerization is known as head-to tail polymerization or 1-2 addition. Its essential feature is that the first (head) carbon atoms in every propylene molecule joins with another propylene molecule by binding to its second (tail) carbon atom. One noticeable result of this 1-2 addition is that none of the methylene groups are adjacent, but are isolated from each other; another is that the pendant methyl group [sic] are also isolated in that none of them "dangle" from adjacent carbon atoms.

494 F. Supp. at 376-77 (Footnote omitted). Since the count requires only that qualifying polypropylene consist of "essentially" recurring propylene units, it permits small variations from a predominant structure of recurring head-to-tail propylene units.

Phillips claimed and the district court agreed that the 1953 application's description of the temperature and

pressure conditions under which the polymer was to be prepared from propylene inherently disclosed the "essentially recurring propylene units." The application stated:

> The temperature to be used in carrying out the polymerization reaction depends to some extent on various factors, such as the solvent, but normally ranges from about 150 to 450°F. The preferred range for propylene and higher 1-olefins is 150 to 250°F and that for ethylene is 275 to 375°F.
>
> . . .
>
> The pressure must be high enough to maintain the diluent in the liquid phase and to assure that olefins not liquified under these conditions are dissolved in the liquid phase in sufficient amount. This requires a pressure of at least 100 to 300 psig, depending on the feed and the temperature, and a pressure of approximately 500 psig is to be preferred.

Joint Appendix Vol. II, p. A856.

In reaching its conclusion of inherency, the district court relied on the testimony of Dr. Thomas G. Fox, a professor of chemistry at the Carnegie-Mellon University in Pittsburgh, Pennsylvania, who was head of the Basic Polymers Research Laboratory of the Rohm and Haas Company from 1951 to 1957 and who thereafter became supervisor of a polymer research group at the Mellon Institute for Research. Dr. Fox testified that a polymer chemist in 1953 would have recognized that a temperature of 150 to 250°F and pressure of 500 psig were "mild" conditions of polymerization. Joint Appendix Vol. III, p. B372. He testified that the polymer chemist would have expected that polypropylene obtained under such conditions would have a structure of recurring propylene units. *Id.* This testimony is supported by a 1953 publication, *Principles of Polymer Chemistry,* by Dr. Paul J. Flory, a leading authority in the field of polymer chemistry.

Appendix A

Montedison attempts to refute Dr. Fox's testimony by referring to prior art which it claims establishes that polymerization under milder conditions than those used in the Phillips process produced polymers having a tree-branched structure, the antithesis of a straight line, head-to-tail structure.[10] Montedison's reliance on these references appears to be misplaced. In the first place, there is ample evidence in the record that the processes involved in those prior art references could not be characterized as "mild" since they had to be conducted at extremely low temperatures. Even Montedison's expert, Dr. Cecil Bawn, refused to characterize the temperatures used in the references as "mild". Joint Appendix Vol. VI, pp. B1690, 1693, 1698. This "mildness" was, however, an essential aspect of Dr. Fox's statement that a linear polymeric structure would be expected to result from the "mild" polymerization conditions of the Phillips process. In the second place, the polymerization processes described in the references are different from the Phillips' process; for example, a different catalyst is used. The significance of this is recognized in one of the references itself, were the following appears:

> Among the various monomers and various catalyst systems, however, major differences are found with respect to ease of polymerisation, side reactions,

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[10] Montedison cites United States Patent No. 2,387,784, issued October 30, 1945, to Robert M. Thomas and Harold C. Reynolds, Joint Appendix Vol. XV, p. C2084; United States Patent No. 2,474,670, issued June 28, 1949 to Arthur B. Hersberger and Randall G. Heiligmann, Joint Appendix Vol. XV, p. C2089. C. M. Fontana, "Polymerisation of 1-Alkenes with Promoted Aluminium Bromide," in *Cationic Polymerisation and Related Complexes* 121 (P.H. Plesch, ed. 1953), Joint Appendix Vol. XV, p. C2092; C. M. Fontana et al., "Catalyzed Polymerisation of Monoalkylethylenes." in 44 *Industrial and Engineering Chemistry* 1688 (1952), Joint Appendix Vol. XV, p. C2106.

> types of products, and the effects of temperature, monomer concentration and promoter concentration on the quality of the product.
>
> Moreover, the conclusions regarding the detailed mechanisms applying in one particular monomer-catalyst system are often found to be inapplicable to other systems.[11]

Thus, even if the "tree-branched polymer structure" which Dr. Bawn testified was the structure of the polymer product of one of the references,[12] was the structure of the polymers produced by the methods of the other three references as well, those references do not compel a conclusion that Dr. Fox's statement that a linear polymeric structure would be expected to result from the mild polymerization conditions of the Phillips' process was erroneous.

Montedison and Standard argue that a reference to unsaturation in the 1953 Phillips application is inconsistent with a product structure of recurring propylene units. They stress that "unsaturation" is synonymous with double bonding in the molecular structure. The contention as to unsaturation stems from claim 33 in the Phillips application which stated:

> 33. Polypropylene in which the major portion of the unsaturation therein is trans-internal and vinyl.

From this language Montedison argues, "This presence of appreciable unsaturation is inconsistent with the requisite of 'recurring propylene units.'" Montedison Brief, p. 40.

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[11] Fontana, "Polymerisation of 1-Alkenes with Promoted Aluminium Bromide," *supra* note 10, Joint Appendix Vol. XV, p. C2092.

[12] When questioned about this, Dr. Fox pointed out that in Fontana's article Fontana characterized his statement as to the structure as a "hypothesis." Joint Appendix Vol. VII, pp. 2182-86.

It is, however, evident that the claim does not indicate the presence of major or "appreciable" unsaturation. Rather, the phrase is: "the major portion of the unsaturation . . ." As the district court pointed out, the application expressly disclosed that the unsaturation of Phillips' polypropylene is no more than 2.4 double bonds per molecule. The court stated, "Fox testified that since the total number of recurring units in the molecules was greater than 400, it is justifiable to conclude that a skilled polymer chemist would have known that Phillips' scientists were discussing a 'minor feature' of the structure in their polymers." 494 F. Supp. at 432 (footnote omitted). Since the unsaturation was a negligible amount, it was not inconsistent with the limitation of the count that the product consist "essentially" of recurring propylene units.[13]

2. *Polypropylene "having a substantial crystalline polypropylene content."*

The count requires that the polypropylene have "a substantial crystalline polypropylene content." The appellants stress the conceded fact that the word "crystalline" does not appear in the Phillips 1953 application. Nonetheless, if the product was disclosed to be, in fact, crystalline in conformity with the count, the inventors' failure to appreciate the product's crystallinity, as such, does not detract from the adequacy of the disclosure. *See Miller v. Watson,* 129 F. Supp. 241, 242 (D.D.C.), *aff'd,* 229 F.2d 21 (D.C.Cir. 1955). As we previously indicated, an acceptable disclosure need not be in any precise language. *See Dia-*

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[13] In light of the minor amount of unsaturation disclosed in the Phillips application, Standard's vigorous argument based on the subsequent information provided by Phillips in connection with its British patent application misses the mark. *See* Martin v. Johnson, 454 F.2d 746, 750 (C.C.P.A. 1972).

mond Rubber Co. v. Consolidated Rubber Tire Co., 220 U.S. 428, 436 (1911).

The molecules in crystalline matter, such as the crystalline polypropylene of the count, are arranged in an orderly fashion with respect to each other and are bonded together more tightly than is the case with the random grouping of molecules characteristic of an amorphous material. Joint Appendix Vol. III, pp. B288-90. Crystallinity imparts the attributes of rigidity, strength and resistance to heat. Because the count requires that there be "substantial" crystalline polypropylene content, polypropylene containing an inconsequential amount of crystalline polypropylene is excluded.

The district court accepted Phillips' contention that the substantial crystalline characteristic of Phillips' polypropylene was inherently disclosed in the application in the recitation of the properties of its polypropylene. The specification pertaining to polypropylene states,

> The solid polymer fraction is insoluble in pentane at room temperature. The solid material has a melting point in the range of 240 to 300°F, a density in the range of 0.90 to 0.95, an intrinsic viscosity in the range of 0.2 to 1.0, and a weight average molecular weight in the range of approximately 5,000 to 20,000.

Joint Appendix Vol. II, pp. A881-82. In addition, there appears in the specification the following description of a technique for measuring melting point,

> The melting point was determined from a cooling curve of temperature vs. time,

which the district court construed as applicable to the polypropylene of the application.

The appellants do not challenge the general principle that disclosure of an attribute of a chemical compound,

here a substantially crystalline polypropylene structure, may be accomplished by means of a listing of properties of the compound necessarily reflecting the presence of the attribute. It is clear that adequate disclosure may be by any means, since the objective is to communicate the invention to the reader who is skilled in the art. *See In re Bridgeford,* 357 F.2d 679, 682-83 (C.C.P.A. 1966). Rather, the appellants contend that the properties of the solid polypropylene given in the 1953 application, taken singly or together, would not have disclosed that the polypropylene had the characteristic of substantial crystallinity to polymer chemists reading the application in 1953.

In concluding that the 1953 application inherently disclosed substantial crystalline polypropylene the district court relied on the testimony of Dr. Fox and another Phillips expert, Dr. Bailey, as well as the repetition experiments conducted by six independent research groups. Standard and Montedison raise both general and specific challenges to this evidence. Standard argues that Fox's testimony runs counter to "what was the appreciation at Phillips in 1952." Standard's Brief, p. 40. The appropriate inquiry, however, is the understanding and appreciation of knowledgeable polymer chemists at that time, rather than only the appreciation of Phillips. Moreover, subsequent testimony is admissible to show what interpretation would have been placed on a description of an invention in an application at the time of the filing of the application. *In re Lang,* 644 F.2d 856, 863 (C.C. P.A. 1981); *In re Hogan,* 559 F.2d 595, 605 (C.C.P.A. 1977).

Standard argues, further, that the district court should not have accepted the melting point, density and intrinsic viscosity ranges set forth in the application because these ranges "were mere best guesses" by Hogan, the inventor.

Hogan testified that far from being "guesses", those ranges were his estimates based on actual data, "evaluation and characterizations", made on these polypropylene products "reported back to [him]." Joint Appendix Vol. XIX, pp. E48-49. Standard does not refer us to any authority for its contention that an application which utilizes estimated ranges is defective. The precedent points to a contrary result. *Krantz v. Olin,* 356 F.2d 1016, 1019 (C.C.P.A. 1966) (citing *Telephone Cases,* 126 U.S. 1, 535-36 (1888)), *cert. denied,* 386 U.S. 982 (1967). Since Standard does not contend that Hogan's estimates were wrong, arbitrary or unreasonable, its attack on this ground must fail.

Standard and Montedison argue that the district court erred in considering the density, melting point and intrinsic viscosity data an inherent disclosure of crystalline polypropylene in that similar data in the application describes the polyethylene also claimed in it. Therefore, they continue, the description is not of a unique product. This argument ignores the fact that in the application itself the data is expressly applied to *polypropylene,* which necessarily distinguishes the product from polyethylene and other products. Joint Appendix Vol. II, p. A890.

a. "[I]nsoluble in pentane at room temperature."

With respect to the property of insolubility stated in the 1953 application, Fox testified that the skilled polymer chemist who in 1953 read that Phillips' solid polypropylene was "insoluble in pentane at room temperature" would have understood: (1) that pentane was a chemically suitable solvent for dissolving polypropylene, (2) that the asserted insolubility of the polypropylene indicated that it was either cross-linked or crystalline and (3) that "insoluble . . . at room temperature" meant that

the product was soluble at some higher temperature and that therefore it was crystalline rather than cross-linked since cross-linked polymers were known to be insoluble at any temperature. Joint Appendix Vol. III, pp. B290-92, B296, B368, B374-75; Joint Appendix Vol. VII, pp. B2116-18. The district court made an express finding as to #1 above, 494 F. Supp. at 415, and Dr. Fox's other two conclusions are supported by contemporaneous publications, including an article by Montedison's expert, Bawn.[14]

Montedison argues that the trial court erred in relying on pentane insolubility as being indicative of crystallinity because in a 1949 article, the authors reported their finding that an amorphous polyvinyl ether was insoluble in a solvent in which the crystalline polymer was soluble.[15] Although Fox conceded that the Schildknecht finding appeared to represent an exception to the rule that amorphous polymers are more soluble than crystalline polymers, Joint Appendix Vol. VII, p. B2190, there is some discussion in that article itself as to whether the insolubility of the amorphous material may have been due to cross-linking. In any event, the trial court's finding of inherent disclosure of crystallinity was not based on the insolubility disclosure alone, but rather on the totality of the properties disclosed.

b. "[M]elting point in the range of 240 to 300°F"; "The melting point was determined from a cooling curve of temperature vs. time."

The Phillips application specified a "melting point" in the range of 240 to 300°F." There was agreement in the

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[14] Mark & Tobolsky, *Physical Chemistry of High Polymeric Systems* 267 (1950), Joint Appendix Vol. VIIII, p. C1496; Bawn, *The Chemistry of High Polymers* 136 (1948), Joint Appendix Vol. XIII, p. C1492. *See also* Joint Appendix Vol. VI pp. 1926-36.

[15] Schildknecht et al., "Isomerism in Vinyl and Related Polymers", 41 *Industrial and Engineering Chemistry* at 1998 (1949).

district court that only crystalline materials have "melting points" while amorphous materials may be said, by contrast, to have "second order transitions," "softening points," or "glass transitions.' *See, e.g.*, Joint Appendix Vol. VI pp. B1849-50. Also, Dr. Bawn of Montedison agreed that the distinction between "melting point" and "second order transition" was well known in 1953. *Id.* On the other hand the record shows that the precise term "melting point" was not always scrupulously observed in the literature of the period and sometimes was used to indicate a second order transition of an amorphous material. For this reason appellants argued in the district court, as they do here, that the reference to "melting point" in the Phillips application did not necessarily disclose to skilled polymer chemists that the material being described had a crystalline content.

However, there was convincing testimony in the district court that when "melting point" was used improperly in various publications, the amorphous nature of the material in question was made otherwise evident so that no confusion as to structure resulted from the misuse of the term. *See* Joint Appendix Vol. III, pp. B452-55; Joint Appendix Vol. VI, pp. B1870-71, B1874-81, B1885-87. In addition, Dr. Bailey, a Phillips' expert upon whose testimony the district court expressly relied, testified that where the expression "melting point" was used in the literature without other qualification, it necessarily indicated, and so indicated in 1952, a crystalline transition, *i.e.*, a transition from a crystal to an amorphous form. 494 F. Supp. at 421, 431; Joint Appendix Vol. VII, p. B2226. Dr. Fox also testified that as used in the 1953 application with respect to Phillips' polypropylene, the term necesssarily indicated a crystalline content. Joint Appendix Vol. III, p. B342.[16]

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[16] Dr. Fox also testified that the range of melting points indicated crystalline polymers. Joint Appendix Vol. VII, pp. B2129-41.

Furthermore, Dr. Fox's unrebutted testimony was that a melting point determined on the basis of a temperature-time cooling curve "clearly indicated that you have a crystalline polymer." Joint Appendix Vol. III, p. B374; *see also* Joint Appendix Vol. VI, pp. B1352-53. The cooling curve technique is used to discover the freezing point of a crystalline material, the point at which a molten, liquid material freezes being approximately the same as the point at which the solid material melts. Joint Appendix Vol. III, pp. B308-309, B322. A curve plotted on the basis of a series of points in time and the corresponding temperature readings at each point of the pre-heated and now cooling material shows an initial fast cooling until a plateau, a period of slow cooling which is the freezing point, is reached. Joint Appendix Vol. III, pp. B312-21. The plateau in turn is followed by rapid cooling again. With respect to an amorphous material, there is no freezing, no phase change from liquid to solid, a cooling cure shows no plateau, and the cooling curve technique, therefore, has no application. Joint Appendix Vol. III, pp. B324-28; *see* 494 F. Supp. at 414-15.

Appellants contend that the district court erred in concluding that the 1953 application disclosed that a cooling curve technique was used to determine the melting point of Phillips' solid polypropylene since the technique is not mentioned in the paragraph of the application giving the properties of polypropylene but, rather, appears at the end of the next paragraph which gives the properties of Phillips' polyethylene. The district court's conclusion was based on testimony of Drs. Fox and Bailey that readers of the application would assume that the melting points of both Phillips' polypropylene and polyethylene were obtained by the same cooling curve method. Joint Appendix Vol. III, pp. B315-16; Joint Appendix Vol. IV, pp. B848-50. Indeed, the paragraph in the application

following the reference to the cooling cure states, without express reference to either the polypropylene or the polyethylene described in the preceeding paragraphs, how "the weight average molecular weights" were determined. Since one must assume that this information applies to both polymers despite the absence of any reference to either of them, the district court's conclusion that the same inference must be drawn as to the language in the preceding paragraph was reasonable.

Appellants contend that *substantial* polypropylene crystallinity was not shown by the melting point and cooling curve disclosures and that the district court made no finding reversing the Board's negative finding in this respect. However, the district court specifically addressed this question and found that substantial crystallinity was disclosed based on Fox's testimony that a freezing point plateau which did not indicate a substantial amount of crystallinity would not be reported. 494 F. Supp. at 431; Joint Appendix Vol. III, pp. B412-13.

c. "[D]ensity in the range of 0.90 to 0.95."

Today, the accepted density[17] value for 100 per cent crystalline polypropylene is 0.946 g./cm^3 while amorphous polypropylene density is considered to be in the area of 0.85. Joint Appendix Vol. X, pp. B3904, B3915. Thus, the polypropylene density range of 0.90 to 0.95 stated in the 1953 application would today indicate, without question, substantial crystallinity. However, appellants argue that in 1953 that density range would not have disclosed a crystalline polypropylene since many amorphous materials were then known to have densities

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[17] "[D]ensity is a measure of the amount of matter per unit volume in grams per cubic centimeter." Joint Appendix Vol. III, p. B345.

in that range and the density of amorphous polypropylene was not known.

While Dr. Fox conceded that some amorphous materials have a density higher than the range of .90 to .95, he testified that with respect to polypropylene and the density data known about the existing amorphous polypropylene in 1953, the high density range given in the 1953 application for Phillips' solid polypropylene would have caused polymer chemists to conclude that it was crystalline. Joint Appendix Vol. III, pp. B475-78. Dr. Fox testified that although in 1952 polymer chemists did not know the precise density of amorphous polypropylene, they could approximate it from other known information with sufficient certainty to conclude that a new polypropylene reported with a density of .90 to .95 was crystalline. Joint Appendix Vol. VII, pp. B2118-20. He also testified that a comparison of the low densities given in the 1953 application for the liquid fractions of Phillips' polypropylene with the high density given for Phillips' solid polypropylene would also cause polymer chemists to conclude that the solid polymer was crystalline. Joint Appendix Vol. III, pp. B509-12.

d. "[I]ntrinsic viscosity in the range of 0.2 to 1.0, and a weight average molecular weight in the range of approximately 5,000 to 20,000."

Dr. Fox testified that polymer chemists would have understood that the range of intrinsic viscosity describing Phillips' solid polypropylene in its 1953 application was a laboratory-measured flow time, between given points, of the polymers in solution and that the range of molecular weight given was a conservative estimate made on the basis of the measured intrinsic viscosity. Joint Appendix Vol. III, p. B345-66. Dr. Fox testified that the polymer chemist would understand, particularly from the intrinsic

viscosity figure, that Phillips' new polypropylene was an industrial polymer of high molecular weight. *Id.*, p. 367. Moreover, Dr. Fox testified, since the intrinsic viscosity can only be taken of a polymer in solution and since cross-linked polymers are not soluble, a polymer chemist would conclude that Phillips' polymer was crystalline as opposed to cross-linked. *Id.*, pp. 368-69. Because cross-linking, as well as crystallinity, may account for the insolubility of a polymer, the information in the 1953 application that Phillips' solid polypropylene was "insoluble in pentane" might have led to the assumption that the polypropylene was cross-linked. The intrinsic viscosity data eliminated the possibility of cross-linking. Thus, this data contributed to the disclosure of crystallinity.

The district court concluded that the evidence of the significance of solubility, viscosity, density and melting point determination contributed to the ultimate finding of inherency. 494 F. Supp. at 431. Our examination of the record leads us to the same conclusion.

B.

The Repetition Experiments

In addition to reliance on the properties of the Phillips' polypropylene set forth in its 1953 application, the district court also relied on the results of certain repetition experiments which were conducted by six independent research groups, including Montedison's and Du Pont's research scientists, during the period 1955 to 1965. The district court found that those experiments followed the disclosures in Phillips' 1953 application and that the products obtained as a result contained the necessary count structure.

Montedison and Standard contend that in admitting and crediting this evidence the district court ignored the

"invariability" rule of inherent disclosure set forth in *Stamicarbon, N.V. v. Chemical Construction Corp.*, 544 F.2d 645 (3d Cir. 1976). They argue that because there were also many unsuccessful experiments by these same scientists, purportedly following Phillips' disclosures, in which remote products such as polyehtylene and oil were produced, there was no invariability and therefore there could be no inherency.

The *Stamicarbon* case arose out of an interference for a patent for a urea synthesization process. The contending parties were Chemico, which claimed under the Mavrovic patent, and Stamicarbon, which claimed under the Bongard patent. Stamicarbon sought to relate the Bongard application back to the filing date of a Netherlands patent application filed earlier by Bongard. Such relation back would not be permitted unless Bongard's Netherlands application explicitly or inherently disclosed the same process as was the subject of the Mavrovic patent application.

After deciding that the Bongard application did not explicitly disclose one of the principal elements of the Mavrovic process, this court, by a divided panel, then turned to the law of inherency and referred to the well-established rule that for inherency, it "is not sufficient that a person following the disclosure might obtain the result set forth in the count; it must invariably happen." 544 F.2d at 652 (quoting *Gubelmann v. Gang*, 408 F.2d 758, 766 (C.C.P.A. 1969)). The court also stated that it must focus on the entire disclosure. The examination of the language of the patent application and the embodiments, the schematic diagrams, included in the application led the panel majority to its conclusion that the relevant portion of the Bongard application was ambiguous, and that one of the embodiments and the language of the application itself were inconsistent with the inherent disclosure on which Bongard relied.

Judge Wright distinguished *Stamicarbon* from this case on the ground that *Stamicarbon* involved a process patent, where the application must disclose a functioning process which "must work every time", whereas this case involves a product patent where "the only claim is that when the disclosed process produces a product with certain specified characteristics, that product invariably falls within the Count." 494 F. Supp. at 384. Montedison and Standard argue that the district court committed a fundamental error of law, Standard terming the court's distinction between product and process "pure sophistry." Standard's Brief, p. 34.

In considering the application of the invariability rule set forth in *Stamicarbon* and other cases cited by appellants, it is necessary to keep in mind that certain obvious difficulties inhere in imposing a requirement that repetition experiments must "invariably" produce the product of the count. Anyone familiar with laboratory experimentation is aware that many variable may affect the success of any particular experiment. *See* Joint Appendix Vol. IV, pp. B983-98. Indeed, it is unlikely that evidence of any repetition experiment would be admissible if we were to condition admissibility on the invariable success of all of the other experiments of the same series. Further, the number of experiments to run is in the discretion of the scientist. "Invariably" successful results will be more likely when fewer experiments are conducted. Therefore, the very nature of the evidence of experiments distinguishes this case from *Stamicarbon* and similar cases where the invariability rule was applied in the court's examination of the application itself to determine whether the invention claimed was the invariable result of the disclosure.

It is significant that none of the cases cited by either appellant in support of their invariability contention in-

volved repetition experiments.[18] Evidence of repetition experiments was credited in *Spero v. Ringold,* 377 F.2d 652, 657 (C.C.P.A. 1967), in the court's conclusion that the procedures set forth in the parent application "would inherently produce" the compound of the count. The court stated that the testimony showed that the compound was always present in the end product, but there was no discussion whether this conclusion was reached from invariably successful sets of experiments. Similarly in *In re Nathan,* 328 F.2d 1005 (C.C.P.A. 1964), the court considered an affidavit reporting the results of subsequent experiments in reaching its conclusion of disclosure of an inherent characteristic of appellants' invention without any discussion concerning possible unsuccessful results.

Evidence of failures goes to the weight of the evidence. However, when the repetition experiments were conducted by third parties, particularly by parties adverse to the party seeking to introduce such evidence, it would impose an impossible burden to require proof of the reason for the failure of some of the experiments. The evidence of failures was before the district court and it was stressed by both Montedison and Standard, so the court was aware of their contention of the significance of the failures.

In this case the district court did not view the evidence of the repetition experiments in a vacuum, but in conjunction with the properties disclosed in the application. These appellants contended that the disclosure of these properties, some of which were in the form of ranges, did not inherently disclose the crystalline polypropylene of the count. In examining the validity of that contention,

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[18] In Wagoner v. Barger, 463 F.2d 1377 (C.C.P.A. 1972), the court held the evidence of *ex parte* repetition experiments offered as evidence was relevant only to actual rather than constructive reduction to practice. Thus, it never reached the issue of invariability as applied to such evidence.

the district court was justified in disregarding the experiments which did not produce products within those ranges. The district court, instead, focused on the results of the experiments using processes which did parallel those described in Phillips' 1953 application and produced products that fell within the given property ranges. Significantly, each of those products which did fall within the given property ranges was found to be crystalline polypropylene.[19] Under the circumstances of this case, where the use to which the repetition experiments was put related to the description in the application, we are unwilling to hold that the rule of "invariability" set forth in *Stamicarbon* precludes admitting or crediting such evidence.

Montedison contends that there was no proof in the district court that any of the products admitted into evidence satisfied all four criteria of density, insolubility, melting point and intrinsic viscosity stated in the 1953 application. While appellants stress that there were unreported properties as to many of the products admitted into evidence, the reported properties were found to conform with the description in the 1953 application. Moreover, at least six of the admitted products totally or necessarily conformed to the criteria of the 1953 application, or their reported properties varied so slightly from that criteria as to be virtually the same. *See Spero v. Ringold*, 377 F.2d at 657 n.2. The district court summarized its finding of inherent disclosure as follows:

> In sum, Phillips showed that at least six experimenters attempted to duplicate its 1953 disclosures

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[19] There is some irony in Montedison's position on this issue because the inventor from whom it claims the patent, Natta, published an article in 1955 which said, in the language used by Montedison's lawyer in the oral argument before us, "I found crystalline polypropylene through the Phillips' disclosure." Transcript of Argument April 23, 1981, p. 23.

> and that each of them produced a product which, insofar as its properties were measured and reported, complied with the requirements of Phillips' application. That product always and invariably satisfied the limitations of the Count. This evidence, especially when combined with the testimony of Fox and Bailey regarding the direct disclosures of the Phillips applications, convinces the Court that Phillips's 1953 application disclosed crystalline polypropylene. This finding is particularly justified by the failure of the other parties to cite a single instance of the production of a material that complied with Phillips's description that was not crystalline polypropylene.

494 F. Supp. at 430. We believe there is ample support for this finding in the record. We therefore affirm the district court's finding of inherent disclosure.

C.

Utility Disclosure

The patent law authorizes the grant of a patent only for a new and "useful" process or product. 35 U.S.C. § 101. Any consideration of the requirement that a patent application must show utility should begin with the decision of the Supreme Court in *Brenner v. Manson,* 383 U.S. 519 (1966). In applying that requirement to a chemical process, the Court rejected the view that a sufficient showing of utility can be made merely because the chemical process produces the intended product or the compound yielded belongs to a class of compounds which are the subject of serious scientific investigation. Instead, the Court reasoned that the statutory grant of a patent monopoly is given only for "the benefit derived by the public from an invention with substantial utility." *Id.* at 534. The Court continued.

> Unless and until a process is refined and developed to this point—where specific benefit exists in currently available form—there is insufficient justification for permitting an applicant to engross what may prove to be a broad field.

Id. at 534-35. The Court also accepted the Patent Office's rejection of the contention that there was a sufficient showing of utility because a related compound had demonstrated utility, since there was no showing that the compound yielded by the process at issue would have characteristics and effects similar to the other compound.

Phillips' 1953 application states:

> The solid polymers and copolymers of the invention have utility in applications where any of the solid plastics are used.

The Phillips utility disclosure is thus clearly different from that considered in the *Brenner* case in several significant respects. Here there is an assertion of actual, not merely potential, benefit. Furthermore, the statement of utility is directed to the immediate practical utility of Phillips' product.

Montedison and Du Pont, however, contend that the Phillips statement of utility is too vague to be an adequate disclosure of substantial utility and rely on the holdings in *Anderson v. Natta,* 480 F.2d 1392 (C.C.P.A. 1973), and *Petrocarbon Ltd. v. Watson,* 247 F.2d 800 (D.C. Cir. 1957), *cert. denied,* 355 U.S. 955 (1958). These cases are distinguishable. The Phillips application has an affirmative statement of utility, unlike the product description, "plastic-like", relied on as a disclosure of utility in *Anderson v. Natta.* Similarly, in *Petrocarbon Ltd. v. Watson,* the patent application was for a process producing polymers forming films but the application failed to disclose

the use for such films. 247 F.2d at 801; *but see* Judge (later Chief Justice) Burger's dissenting opinion. *Id.* at 802. That application also stated that the polymers were useful because of their thermal stability and resistance to various fluids but failed to disclose how those properties might contribute to the polymers' utility. *Id.* at 801. Thus the court held the disclosed characteristics of the polymers did not constitute a utility disclosure. In contrast, the Phillips application contained both a statement of utility and disclosure of the properties of solid polypropylene.

The requirement that a specific utiltiy must be disclosed is directed to one skilled in the art; that which is obvious to such a skilled person, including obvious specific utility, need not be expressly stated. *See Yasuko Kawai v. Metlesics,* 480 F.2d 880, 886 (C.C.P.A. 1973); *In re Hafner,* 410 F.2d 1403, 1406 (C.C.P.A. 1969). *See also Eli Lilly & Co. v. Premo Pharmaceutical Laboratories, Inc.,* 630 F. 2d 120, 133 (3d Cir.), *cert. denied,* 449 U.S. 1014 (1980); *Trio Process Corp. v. L. Goldstein's Sons, Inc.,* 461 F.2d 66, 74 (3d Cir.), *cert. denied,* 409 U.S. 997 (1972). Fox testified that in 1952 the plastics industry was a well-known, fast-growing field in polymer industrial chemistry, and a polymer chemist in 1952 would have understood that a solid polymer which was said to have the usefulness of a solid plastic could be used as existing polymer plastics were then being used, *i.e.,* that it was a moldable material of high Young's modulus[20] for which many specific appli-

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[20] Young's modulus is the ratio of force, per unit area, to elongation in material to which force has been applied. Joint Appendix Vol. III, pp. B264-65. Material which responds to great force applied to it with little resulting elongation is said to have a high Young's modulus. A diamond has a high Young's modulus of 10^{13} dynes per square centimeter and steel has a high Young's modulus of 10^{12} compared to rubber which has a low Young's modulus of 10^{7}. *Id.* Polymer plastics have a Young's modulus of 10^{11} to 10^{9}. Joint Appendix Vol. VII, p. B380.

cations were known to exist. Joint Appendix Vol. III, pp. B256-69; B378-81; Joint Appendix Vol. III, pp. B2176-78.[21] Fox testified that among such applications were "mold[ing] a button, a poker chip, a rod, a sheet" and extruding filaments for insulation for noise and for heat. Joint Appendix Vol. VII, p. B2150. The trial court relied on this testimony in finding the disclosure of a definite practical utility.

Appellants contend that the record shows that Phillips' polypropylene was too brittle for some uses as a plastic. However, Fox testified that brittleness was known to be easily corrected with the addition of plasticizers. Joint Appendix Vol. III, p. B497. Moreover, Fox testified that even if the Phillips polypropylene was brittle, many useful applications remained.

Id. pp. B266-73, B494-97.

Proof of one of the disclosed utilities suffices to meet the statutory utility requirement. *Krantz v. Olin,* 356 F.2d

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[21] Fox testified:

> If you mentioned plastic [in 1952] to a polymer chemist, there would be three things that would stand out in his mind: You talk about an industrial product, a synthetic polymer; you are talking second about a material which is rigid in the sense that a metal bar or a glass plate is rigid as opposed to a fluid or an easily extensible rubber-like material; and the third thing he would think of is that this material is capable under some conditions of being soft and able to flow, and you can mold it, under those conditions, into a desired shape, desired dimensions, shape, and then under certain other conditions, for example, if you heated it to soften it to mold it, then on cooling it would retain the shape of the molded article and would become rigid, in that sense form stable and hard to deform.
>
> Those are the three characteristics that a polymer scientist would have immediately thought of it you talked about material that might be used as a plastic in 1952.

Joint Appendix Vol. III, p. B259.

at 1019. *See also E.I. du Pont de Nemours & Co. v. Berkley & Co.*, 620 F.2d 1247, 1260 n. 17 (8th Cir. 1980). Therefore, Phillips argues that even if there are uses for solid plastics for which its product was unsuitable, those for which it is suitable are disclosed when its utility statement is considered together with the description of the properties of its product. It is recognized that the required utility disclosure can be met if the disclosed properties of the invention indicate the material is useful for a specific purpose. *See Ciric v. Flanigen*, 511 F.2d 1182, 1185 (C.C.P.A. 1975); *In re Folkers*, 344 F.2d 970, 974 (C.C.P.A. 1965). Fox testified that from the properties described in the Phillis 1953 application obvious specific uses would be inferred:

> The properties described in Page 30 and 31 first of all describe the material as a solid material, and therefore a high Young's modulus. And that's the kind of material that you need for applications as commercial plastics. Describes a melting point in the range of 240 to 300, which means that it can be heated and softened and you can mold it. And, incidentally, that melting point is higher than the glass temperatures or melting points of the commercial polymers of the day such as polyethylene and poly—the melting point of polyethylene and the glass temperature of polystyrene, for example, and therefore would lend itself to applications at higher temperatures as a plastic than the common plastics such as polyethylene and polystyrene of 1952.
>
> You expect to use the crystalline polypropylene as a plastic at higher temperatures than you could use polystyrene of the day or polyethylene in 1952, because they have lower melting points or glass temperatures.
>
> The density is in a range where you're talking about a lightweight material. That's beneficial. And you

> have intrinsic viscosities indicating that you have molecular weights in the range of commercial plastics materials. So the properties described in the paragraph on Page 31 suggest that this would be a very interesting and useful plastic indeed.

Joint Appendix Vol. III, pp. B381-82; *see also id.*, B262-63, B383 and B495-96, Joint Appendix Vol. VII, pp. B2144-52, Joint Appendix Vol. VII, p. B2150. The court relied upon Dr. Fox's analysis in rejecting the challenges to Phillips' disclosure of utility. 494 F. Supp. at 435.[22] We agree that the utility disclosure was adequate.

V.

MISCELLANEOUS RULINGS

Appellants raise a number of discrete issues relating to various evidentiary rulings made by the district court in the course of the lengthy trial. We consider only the major contentions. It is argued that Dr. Fox was not sufficiently familiar with crystalline polypropylene in 1953 to be qualified to testify as to the state of that art. We believe, however, the relevant art must be the broader one of polymer chemistry, crystalline polypropylene not having been discovered until 1953 or shortly before that date. *See Trowbridge v. Abrasive Co. of Philadelphia*, 190 F.2d 825, 829 (3d Cir. 1951). Dr. Fox appears to have been well qualified to testify with respect to polymer chemistry; moreover, the question of expert qualification is a matter particularly for decision by the trial judgge. *Id. See Seese v. Volkswagenwerk A.G.*, 648 F.2d 833, 844 (3d Cir. 1981).

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[22] Although we have not attempted to treat in this opinion every argument raised by the three appellants on appeal, we have considered each of those arguments and have determined that none of them detracts from our ultimate determination that an affirmance is appropriate.

Montedison argues that the district court erred in admitting the testimony of Drs. Fox and Bailey and other Phillips' witnesses without requiring Phillips to show special circumstances explaining why the testimony was not presented first to the Board. However, new expert testimony is clearly admissible in a section 146 action without such justification to the extent that it aids the court in understanding issues already presented to the Board. *Minnesota Mining & Manufacturing Co. v. Carborundum Co.*, 155 F.2d 746, 748 (3d Cir. 1946); *see Minnesota Mining & Manufacturing Co. v. Van Cleef*, 139 F.2d 550, 555 (7th Cir. 1943).

Montedison urges that the district court erred in admitting the evidence of the repetition experiments conducted by Montedison's Cappucci and Longi which was rejected by the Board as untimely submitted. The Board's rejection of the evidence of the Cappucci and Longi work on the ground that it was untimely presented may well have been influenced by its view that all such repetition experiments were inadmissible *nunc pro tunc* evidence in any event. However, the district court correctly overruled the Board on the question of the admissibility of evidence of subsequent repetition experiments to prove inherent disclosure of a count invention in a patent application. *See Spero v. Ringold*, 377 F.2d at 657-58. Even if the district court erred in admitting evidence rejected on a procedural ground by the Board, the error was harmless. The Cappucci and Longi evidence is cumulative. Other repetition evidence establishes that Phillips' 1953 application inherently disclosed the crystalline polypropylene of the count.

Montedison and Standard contend that the *ex parte* experiments of Phillips' Witt and DeLap were erroneously admitted and accorded weight by the district court. Where, as here, the party seeking to discredit *ex parte* tests is permitted discovery of the persons who performed

them and cross-examination at trial of the witness who testifies as to the conditions of the tests and their relevance, such tests have the status of other evidence and the district court did not err in finding them persuasive on the question of inherent disclosure. *See Johnson & Johnson v. W. L. Gore & Associates, Inc.*, 436 F. Supp. 704, 719 n.28 (D. Del 1977); 5 *Wigmore on Evidence* § 1385(3) (Chadbourn rev. ed. 1974).

Having concluded that Phillips' 1953 application disclosed the count invention and upon consideration of the record made in the Patent Office on the patentability of the count invention, the district court determined that Phillips' crystalline polypropylene is patentable to Phillips and authorized the Patent and Trademark Office to issue the patent to Phillips as authorized under 35 U.S.C. § 146. Montedison urges that this was error in that the issue was decided without having been raised or addressed by the parties. However, as the district court pointed out, the question of patentability of an invention to a successful section 146 plaintiff is not an issue which the district court may ignore. *Hill v. Wooster*, 132 U.S. 693, 698 (1890); *see Sanford v. Kepner*, 344 U.S. 13, 15 (1952). Moreover, following the announcement of its initial decision in an opinion issued January 11, 1980, and before entry of final judgment on February 28, 1980, the district court accepted briefing and heard argument on the issue and, in an opinion issued February 28, 1980, answered appellants' objections. No objections on the merits of the decision are raised on appeal.

For the foregoing reasons, we will affirm the judgment of the district court.

A True Copy:

Teste:

Clerk of the United States Court of Appeals for the Third Circuit

APPENDIX B

Opinion of the District Court.

IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF DELAWARE

STANDARD OIL COMPANY (Indiana),
Plaintiff,
v.
MONTEDISON, S.p.A., et al.,
Defendants.

PHILLIPS PETROLEUM COMPANY,
Plaintiff,
v.
MONTEDISON, S.p.A., et al.,
Defendants.

E. I. du PONT de NEMOURS & COMPANY,
Plaintiff,
v.
MONTEDISON, S.p.A., et al.,
Defendants.

CONSOLIDATED
CIVIL ACTION No. 4319

OPINION

Wilmington, Delaware
January 11, 1980.

WRIGHT, Senior Judge.

Appendix B

This case is an appeal under 35 U.S.C. § 146[1] from a Board of Patent Interferences ("Board") Opinion issued pursuant to 35 U.S.C. § 135.[2] That Opinion awarded Montedison, S.p.A. ("Montedison")[3] priority for the invention

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[1] 35 U.S.C. § 146 provides:

Civil Action in case of interference.

Any party to an interference dissatisfied with the decision of the board of patent interferences on the question of priority, may have remedy by civil action, if commenced within such time after such decision, not less than sixty days, as the Commissioner appoints or as provided in section 141 of this title, unless he has appealed to the United States Court of Customs and Patent Appeals, and such appeal is pending or has ben decided. In such suits the record in the Patent Office shall be admitted on motion of either party upon the terms and conditions as to costs, expenses, and the further cross-examination of the witnesses as the court imposes, without prejudice to the right of the parties to take further testimony. The testimony and exhibits of the record in the Patent Office when admitted shall have the same effect as if originally taken and produced in the suit.

Such suit may be instituted against the party in interest as shown by the records of the Patent Office at the time of the decision complained of, but any party in interest may become a party to the action.

[2] In relevant part, 35 U.S.C. § 135 provides:
Interferences.

(a) Whenever an application is made for a patent which, in the opinion of the Commissioner, would interefere with any pending application, . . . he shall give notice thereof to the applicants. . . . The question of priority of invention shall be determined by a board of patent interferences (consisting of three examiners of interferences) whose decision, if adverse to the claim of an applicant, shall constitute the final refusal by the Patent Office of the claims involved, and the Commissioner may issue a patent to the applicant who is adjudged the prior inventor.

[3] When Montedison first sought a patent for solid crystalline polypropylene it was known as Montecatini, S.p.A. Its name was changed when it merged with Societa Edison.

of solid crystalline polypropylene. Each plaintiff in this litigation, E. I. du Pont de Nemours & Co. ("Du Pont"), Standard Oil Company ("Standard"), and Phillips Petroleum Company ("Phillips".), seeks to invalidate Montedison's claim of priority by establishing that it produced the product prior to Montedison. Each also argues that it is entitled to the patent in its own right. In addition, Du Pont argues that Montedison's senior party status should be vacated on the grounds of a possible discrepancy in inventorship in Montedison's applications, and Phillips premises a the best mode of producing its invention. Montedison desimilar demand upon Montedison's alleged failure to teach fends the Board's decision awarding it priority, claiming that none of the other parties ever completed the steps required for an actual or a constructive reduction to practice.

This case traces its history to the early 1950s. Prior to that time, polymer chemists did not know whether the manufacture of solid crystalline polypropylene was possible, much less how to make it. By 1957, however, at least five companies,[4] including the litigants herein, claimed to have polymerized solid crystalline polypropylene and were seeking patent coverage for their alleged discoveries.[5] On Sep-

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[4] The fifth company was Hercules Powder Company, which claimed the benefit of U.S. Application 500,051, filed by Arthur J. Vanderberg on April 7, 1955. Hercules was initially invited to join this Interference. Interference Report, Paper No. 1. The Patent Office dismissed Hercules on January 31, 1964 for failing to claim a date prior to those claimed by the other parties. Interference Record, Paper No. 195.

[5] Montedison claimed the benefit of American Application No. 514,099 filed by Guilio Natta, et al., on June 8, 1955. Du Pont claimed the benefit of U.S. Application No. 556,548 filed by Warren Baxter, et al., on December 30, 1955. Standard claimed the benefit of U.S. Aplication No. 462,480 filed by Alex Zletz on October 15, 1954. Phillips claimed the benefit of U.S. Application No. 558,530 filed by John Paul Hogan, et al. on January 11, 1956. *See* Interference Record. Paper No. 1.

tember 9, 1958, the Patent Office initiated this interference to determine which applicant, if any, was entitled to receive the American atent rights to solid crystalline polypropylene.[6]

The Primary Examiner initially defined the Interference Count[7] as:

> Normally solid polypropylene having a crystalline polypropylene component.

The parties immediately filed Patent Office Rule 231 Motions[8] in order to change the wording of tihs Count. The Primary Examiner finally decided these motions on June 14, 1962,[9] amending the Count to its present form:

> Normally solid polypropylene, consisting essentially of recurring propylene units, having a substantial crystalline polypropylene content.

Du Pont, Phillips, and Standard subsequently took extensive testimony which was completed by March 25, 1966.[10]

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[6] Interference Record, Paper No. 1.

[7] Interference Record, Paper No. 132.

[8] Patent Office Rule 231 now provides, in relevant part:

> "Within the period set in the notice of interference for filing motions any party to an interference may file a motion seeking . . . . To amend the issue by addition or substituion of new counts. Each such motion must contain an explanation as to why a count proposed to be added is necessary or why a co nt proposed to be substituted is preferable to the original count, must demonstrate patentability of the count to all parties and must apply the proposed count to all involved applications except an application in which the proposed count originated."

37 C.F.R. § 1.231 (July 1, 1979).

[9] Interference Record, Paer Nos. 132 and 138.

[10] Interference Record, Paper No. 263.

Montedison was given until July 29, 1966 to complete its testimony.[11] Montedison proceeded to file ancillary proceedings seeking broad discovery under 35 U.S.C. § 24,[12] and the Patent Office suspended any further action pending resolution of these ancillary proceedings.[13] The Interference was resumed on May 12, 1969,[14] and Natta's testimony period was extended to December 8, 1969.[15] In April, 1970, the parties terminated their rebuttal testimony, having generated more than 800 pleadings papers, deposed more than 100 witnesses, and amased more than 18,000 pages of testimony and over 1000 exhibits.[16]

The parties argued their cases for priority before the Board on October 28 and 29, 1970,[17] and on November 29, 1971 the Board released its 113 page Opinion awarding priority to Mantedison.[18] The Board's Opinion was ap-

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[11] Interference Record, Paper No. 266.

[12] The principle cases involving these discovery motions are reported in In re Natta, 388 F.2d 215 (3d Cir. 1968); Natta v. Zletz, 379 F.2d 615 (7th Cir. 1967); and Natta v. Hogan, 392 F.2d 686 (10th Cir. 1968).

[13] Interfernece Record, Paper No. 314.

[14] Interference Record, Paper No. 404.

[15] Interference Record, Paper No. 460.

[16] Montedison's testimony is hereinafter cited as "Natta Record"; Du Pont's testimony is hereinafter cited as "Baxter Record"; Standard's testimony is hereinafter cited as "Zletz Record"; Phillips's testimony is hereinafter cited as "Hogan Record".

[17] Interference Record, Paper No. 716.

[18] Interference Record, Paper No. 738 [hereinafter cited as "Board's Opinion"]. After the Board awarded priority to Montedison, prosecution upon its application was reinitiated on March 21, 1972. Phillips's Trial 9xhibit No. 945. Phillips's Trial Exhibits will hereinafter be cited by number with the prefix "P". Ten months later, U.S. Patent 3,715,344, P-945A, issued to Montedison.

pealed in early 1972 by Du Pont,[19] Standard,[20] and Phillips.[21] These cases were consolidated in this Court on May 15, 1975.[22] On July 1, 1977, this Court approved and suming eighty-five days between September 19, 1977 and May 17, 1978. The parties generated a transcript in excess of 14,000 pages and prepared about 4,600 exhibits, more than 500 pages of legal memoranda, and nearly 2,000 proposed Findings of Facts and Conclusions of Law, about which they have argued extensively during two rounds of briefing totalling more than 1,800 pages.

In considering the evidence, this Court has generally adhered to the well established rule that clear and convincing evidence must be adduced in order to justify overruling a determination of priority made by the Board. This rule was established by the Supreme Court in *Morgan v. Daniels*:[24]

> [W]here the question decided in the Patent Office is one between contesting parties as to priority of invention, the decision there made must be accepted as controlling upon that question of fact in any subsequent suit between the same parties, unless the contrary is established by testimony which in character and amount carries thorough conviction.[25]

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[19] Civil Action No. 4323. This case was initially filed here on January 27, 1971.

[20] Civil Action No. 4647. This case was initially filed in the District of Columbia on January 26, 1971.

[21] Civil Action No. 4321. This case was initially filed here on January 24, 1971.

[22] Civil Action No. 4319, Pleading Paper No. 76.
signed a 181 page Pre-Trial Order.[23] Trial folowed, con-

[23] Civil Action No. 4319, Pleading Paper No. 204.

[24] 153 U.S. 120 (1893).

[25] *Id.*, p. 125.

The *Morgan v. Daniels* rule, however, is not always applicable. If, for instance, it is established that "fraud and perjury have intervened to impeach the very foundation upon which the ruling of the Patent Office [was] based",[26] the Board's Opinion must be given less weight and may be overturned upon a showing that a mere preponderance of evidence supports an alternative finding.[27]

In this case, all three plaintiffs claim that Montedison acted fraudulently in misrepresenting or failing to supply relevant information to the Examiners. As explained below, this Court finds that Montedison committed fraud against Phillips but that the other fraud claims against Montedison are either inadmissible or without merit.[28] Phillips therefore need only adduce a preponderance of evidence that it is entitled to a priority date different from that awarded by the Board, but since fraud did not impeach the very foundation of the Board's findings with regard to the other plaintiffs, this ruling does not apply to them. The remaining plaintiffs must still adduce clear and convincing evidence to overcome the Board's findings regarding their priority dates.

Applying these standards, this Court finds that Montedison is entitled to a June 8, 1954 priority date as determined by the Board. This Court also finds that Du Pont failed to adduce even a preponderance of the evidence that it is entitled to a priority date prior to the August 17, 1954 date awarded by the Board, and that Standard similarly failed to adduce even a preponderance of evidence showing that it is entitled to a priority date prior to the October 15, 1954 date awarded by the Board. These find-

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[26] Laas v. Scott, 161 F. 122, 124 (Cir.Ct. E.D. Wisc. 1908).

[27] *See also* Etten v. Lovell Mfg. Co., 225 F.2d 844 (3d Cir. 1955).

[28] *See* Fraud Sections, *infra*.

ings are therefore affirmed. This Court, however, reverses the Board's findings as to Phillips, since Phillips did adduce at least a preponderance of evidence demonstrating its entitlement to a priority date no later than January 27, 1953 instead of the January 11, 1956 priority date found by the Board. Since Phillips's date is senior to those of the other three parties, priority is awarded to Phillips.

THE PRODUCT

The distinguishing characteristics of solid crystalline polypropylene are described by the single Count in Interfeernce: (1) normally solid; (2) polypropylene, consisting essentially of recurring propylene units; (3) having a substantial crystalline polypropylene content.[29]

The first limitation requires that the product be *solid*. The term "solid" implies a substance of definite shape,[30] while "normally" is implied when scientists usually characterize a material as solid.[31]

The second limitation requires that the product be a *polypropylene consisting essentially of recurring propylene units*. "Polypropylene" is a substance made by polymerizing molecules of propylene.[32] Propylene molecules contain three carbon atoms (C) and six hydrogen atoms (H) arranged as a methylene group (=CH_2) connected by a double bond to a =CH— group that is in turn connected

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[29] Interferance Record, Paper No. 132, p. 1.

[30] Hackh's Chemical Dictionary 786 (3d Ed. 1944 [hereinafter cited as "Hackh's"].

[31] *See* Interference Record, Paper No. 132, p. 5.

[32] Hackh's Chemical Dictionary 535-36 (4th Ed. 1969).

by a single bond to a methyl group (—CH_3). This arrangement may be depicted as follows:



Figure 1 [33]

In a polymerization reaction, one of the bonds constituting the double bond breaks and provides the propylene molecule with an extra bond with which it can attach itself to other molecules. Sometimes the polymerization is very orderly, resulting in the production of a polypropylene consisting of recurring propylene units:[34]

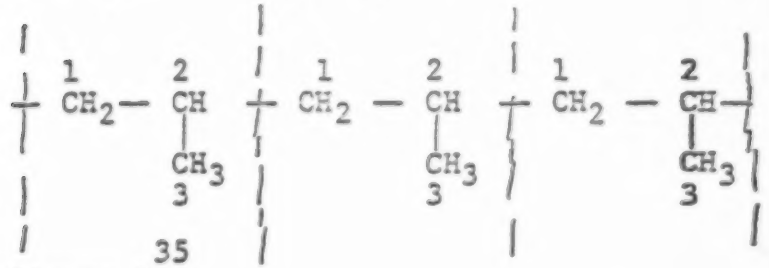


Figure 2

This type of regular polymerization is known as head-to-tail polymerization or 1-2 addition.[36] Its essential feature

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[33] P-1146. The carbon atoms were numbered 1, 2 and 3 following standard procedures of chemical nomenclature. *See* Weininger, Contemporary Organic Chemistry, 167-78 (1972).

[34] Transcript (hereinafter cited as "Tr."), pp. 886-87, 7291, 7361-65, 7783.

[35] P-1196.

[36] *Weininger, supra* note 33 at p. 219.

is that the first (head) carbon atoms in every propylene molecule joins with another propylene molecule by binding to its second (tail) carbon atom. One noticeable result of this 1-2 addition is that none of the methylene groups are adjacent, but are isolated from each other; another is that the pendant methyl group are also isolated in that none of them "dangle" from adjacent carbon atoms.[37]

The Count's second limitation does not require that the polypropylene be composed *solely* of recurring propylene units. As set forth by the Examiners, "The presence of very small irregularities in the polymer chain, in an amount insufficient to effect the basic character of the composition, would not disqualify a polymer from falling within the scope of the substituted count. . . ."[38]

A useful approach to describe the regularity of this structure is comparison of the number of methylene and methyl groups. When propylene polymerizes in a perfectly recurring head-to-tail fashion, the ratio of these numbers is 1.0 because each recurring propylene unit contains one methylene group and one methyl group. A ratio significantly larger than 1.0 indicates that the polypropylene is not composed essentially of recurring propylene units but rather contains an impurity that causes an impermissibly large increase in the number of methylene groups relative to the number of dangling methyl groups.[39]

The third limitation requires that the polymer be *substantially crystalline.* The term "crystalline" describes a

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[37] Pendant methyls can dangle below or stick up from the polymer's main chain. When they all take the same position in polypropylene, the polymer is said to be "isotactic". *Id.*

[38] Interference Record, Paper No. 132, pp. 3-4.

[39] Montedison's Trial Exhibit No. 1261. Montedison's Trial Exhibits will hereinafter be cited by number with the prefix "M".

structure in which molecules of a substance are arranged in a well ordered array[40] known as a lattice.[41] "Crystalline" may be contrasted with the term "amorphous", which describes materials such as glass, liquid water, or air, whose molecules are not arranged in any particular order.[42] The term "substantial" is used in order to exclude solid polypropylenes containing no more than an "inconsequential amount of crystalline polypropylene".[43]

Whether a product complies with the limitations of the Count may be ascertained by comparing certain of its properties with those of solid crystalline polypropylene. The product of the Count is generally a non-tacky, i.e. non-sticky,[44] solid. It is insoluble in pentane and weaker organic solvents.[45] When a sample of polypropylene is only slightly crystalline, it melts at about 230°F. (110°C.), and its density is 0.88 grams per cubic centimeter (g./cm.^{3}); when a sample is very crystalline, it melts at about 347°F. (175°C.), and its density is 0.95 g/cm.^{3}.[46] In contrast, amorphous polypropylene is soluble in pentane and weaker organic solvents, its density is 0.85 g./cm.^{3}, and it softens at 167°F. (75°C.).[47]

The most reliable techniques for determining that a product is solid crystalline polypropylene are infrared and

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[40] Hackh's, *supra* note 30 at pp. 235-38. A general discussion of crystalline materials may be found in Verhoek, Chemistry 291-311 (1968).

[41] Hackh's, *supra* note 30 at p. 790.

[42] Hackh's, *supra note* 30 at p. 50.

[43] Interference Record, Paper No. 132, p. 4.

[44] Hackh's, *supra* note 30, at p. 828.

[45] *See* M-957, p. 216.

[46] *Id.*, p. 221.

[47] *See* M-957, p. 9.

Appendix B

X-ray analysis. Molecular units vibrate when exposed to characteristic wavelengths of infrared radiation, and in so doing, they absorb the infrared radiation. In infrared analysis, the amount of radiation absorbed by a sample at various wavelengths is measured, and a scan, or chart, plotting absorbances against wavelength is prepared. The molecular structure of the product may then be determined by examining the location and quantity of the absorption.[48]

Crystalline polypropylene typically absorbs infrared radiation in the bands or ranges near 7.25, 8.6, 10.03, 10.27, and 11.85 microns, and does not absorb infrared radiation at 13.7 and 13.9 microns.[49] Absorbance at 7.25, 8.6 and 10.2710.27 microns and the lack of absorbance at 8.9 and 13.7 and 13.9 microns indicates the presence of recurring propylene units; absorbance at 7.25 microns specifically indicates the presence of dangling methyl groups.[50] It is evident that these methyl groups are isolated when there is absorbance at 8.6 and 10.27 microns.[51] Methylene group isolation is shown by a lack of absorbance at 13.7 and 13.9 microns.[52] Crystallinity is indicated by absorbance at 10.03 and 11.85 microns.[53]

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[48] *Weininger, supra* note 33 at 33-41.

[49] Tr., pp. 2666, 9110-11. Some scientists in this trial claimed that these bands appeared at slightly different wavelengths, i.e. 10.3 microns as opposed to 10.27 microns. This Court has therefore only indicated that the bands appear "near" the listed wavelengths.

[50] Tr., p. 9110.

[51] *Id.*, pp. 9110-11.

[52] Zletz Record, *supra* note 16, p. 4001.

[53] *Id.*, p. 4000. It is possible, through infrared analysis, to calculate the relative amounts of various structures that are present in a molecule. This is done by choosing a peak as a proxy

(footnote continued on following page)

Appendix B

The other significant technique for identifying crystalline polypropylene is X-ray diffraction. Molecules bend or diffract X-rays. When an amorphous material is exposed to X-rays, the random molecular arrangement produces a random diffraction pattern. In contrast, the well-ordered molecules of a crystalline material produce a distinct and identifiable X-ray diffraction pattern that may be recorded as a picture or as a scan in which the X-ray intensity is plotted at various angles of incidence.[54] It is thus possible to determine whether a material is amorphous or crystalline. The material's chemical constituency is also indicated if the diffraction pattern is similar to one previously prepared for a known sample.[55]

The parties to this litigation generally practiced remarkably similar techniques in producing their respective products. Each party mounted compounds of metals, the working part of the catalyst, upon catalytic supports containing silica and alumina. The catalyst was "activated" by heating it to 800°F. (425°C.) to 1000°F. (540°C.) for at least several hours under an atmosphere of dried gas,

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(footnote continued from preceding page)

for each structure that is to be compared. Total absorbance at each peack is then divided by the amount of infrared radiation absorbed by each such structure, and the resulting values are then compared. For example, a hypothetical scan shows four units of absorbance at 10 microns caused by the presence of X structure and six units of absorbance at 13 microns caused by Y structure, and it is known that X groups normally absorb one unit of infrared radiation and Y groups three. It is possible to calculate that the compound contains twice as much X as Y structure:

$$\frac{X}{Y} = \frac{4}{1} \div \frac{6}{3} = 2.$$

See e.g., text accompanying note 181, *infra*.

[54] *Verhoek, supra* note 40 at 291-95; P-144.

[55] Tr., pp. 2878, 6832-22, 9423 and 9678.

usually air. The catalyst was cooled and stored for the actual polymerization experiment.

Each party placed the catalyst in one of three principle types of reactor: stirred autoclave, shaker autoclave, or fixed bed.[56] A stirred autoclave consists of a closed container with a mixing blade or stirrer, into which chemicals may be admitted. A shaker autoclave is similar, but is agitated by shaking as opposed to stirring. The fixed bed reactor consists of a container in which the catalyst is packed in a column, reactants are admitted at the bottom of the reactor, and agitation is achieved by upward flow of the materials through the catalyst, with the finished product being removed from the top of the reactor.

Reactions were generally run for two to ten hours or more at elevated temperatures and pressures.[57] Propylene was admitted to the reactor along with a hydrocarbon solvent known as a "diluent". When the run was completed, each party removed the diluent and product from the reactor and washed any remaining polymer from the catalyst with a hydrocarbon solvent. The diluent and wash solvent were then separated from the crude polymer. Finally, the crude polymer was usually fractionated, or purified, by dissolving any impurities in a variety of organic solvents. The parties claim that the remaining residue was the product of the Count.

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[56] P-1081.

[57] Pressure is usually reported in units of pounds per square inch (psi) or pounds per square inch gauge (psig). Psig is converted to psi by adding 14.7. In this litigation, unless a scientist specifically indicated that measurements had been made in psig, the Court has assumed that psi was employed. Since none of the parties have claimed that small pressure changes were significant to their ultimate results, the Court believes that the error, if any, of this assumption is insignificant.

Appendix B

The Law of Priority

A priority date may be established by proving either an actual or a constructive reduction to practice.[58] In the former case, one looks to the adequacy of the inventors' experiments, while in the latter case, one looks to the adequacy of the application as filed in the Patent Office.

Actual Reduction To Practice.

Three elements must be proven in order to establish that a product has been actually reduced to practice:[59] (1) Production of a composition of matter satisfying the limitations of the Count; (2) Recognition of the composition of matter; and (3) Recognition of a specific practical utility for the composition.[60]

The production requirement may be satisfied by proving that a product was produced and that it meets the limitations of the Count. The results of subsequent (*nunc pro tunc*) testing are admissible for this purpose.[61] This proposition is most clearly supported by *Silvestri v. Grant*,[62] where the junior party, Silvestri, sought to prove that he had made the invention, a new form of ampicillin, prior to the filing date of the senior party. The junior

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[58] Chisum, Patents §§ 10.05, 10.06 (1979).

[59] Patent law generally distinguishes between patents for products and processes. *Cf., Chisum, supra* note 58 at §§ 1.02-1.03. The instant case involves a product patent, so this Court has limited its discussion to that field.

[60] Meitzner v. Corte, 537 F. 2d 524, 528 (C.C.P.A. 1976).

[61] The Board refused to consider *nunc pro tunc* evidence in its Opinion. That Opinion was rendered, however, without the benefit of the cases cited herein.

[62] 496 F.2d 593 (C.C.P.A. 1974). *See also* Langer v. Kaufman, 465 F.2d 915 (C.C.P.A. 1972); Heard v. Burton, 333 F.2d 239 (C.C.P.A. 1964); Gianladis v. Kass, 324 F.2d 322 (C.C.P.A. 1963); Searle v. Glarum, 179 F.2d 974 (C.C.P.A. 1950).

party introduced the expert testimony of Bomstein who, subsequent to Silvestri's work, examined an infrared scan made from the two parties' products and concluded they were identical. The Court of Customs and Patent Appeals (C.C.P.A.) noted:

> [T]he board was critical of Bomstein's testimony on the ground that it came after the issue of [the senior's party's] patent. That criticism would, of course, be relevant if the testimony were relied on to show that Silvestri had appreciated in 1962 that a new form of ampicillin had been made. However, Bomstein's testimony is used only to establish that Silvestri had *obtained* the new form of ampicillin before December 26, 1962. Accordingly, we accept this testimony as establishing that the ampicillin obtained by Silvestri and that of the count have the same spectograph.[63]

Following this precedent, this Court's analysis will include examination of *nunc pro tunc* evidence in determining whether a party obtained the product.

The Board erred in the appliction of standards to the second requirement of an actual reduction to practice, recognition of the new product. In effect, the Board required that applicants recognize and describe their products' new features using the precise language of the Count.[64] This holding conflicts with case law precedent, and despite the arguments advanced by Montedison[65] and

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[63] 496 F.2d 598.

[64] *See* note 136, *infra*.

[65] Montedison's Main Brief After Trial, p. 13 [hereinafter cited as "Montedison's Brief"]; Montedison's Reply Brief After Trial, pp. 7, 10 [hereinafter cited as "Montedison's Reply Brief"].

Standard, [66] the Court finds that such *in haec verba* recognition and description is unnecesssary. In *Heard v. Burton,*[67] the junior party, Heard, sought to establish an actual reduction to practice for the invention of a process using a catalyst comprising platinum on eta-alumina prior to the senior party's filing date. The Board held against Heard, finding that he had failed to recognize the catalyst by name. The Court of Customs and Patent Appeals affirmed the Board's utilmate disposition, but in so doing noted that *in haec verba* recognition was unnecessary:

> We agree with appellant that it is irrelevant that Heard never referred to or appreciated the support material to be *eta*-alumina or to contain *eta*-alumina *by that name.* Nor do we interpret the board's opinion as so requiring. However, we consider it fatal to appellant's case that not until after appellees' filing date did Heard recognize that his "ammonia-aged" catalyst, as appellees put it, *"contained any different form of alumina at all!"*
>
> We point out, as does appellees' brief, that the count calls for a *particular* form of alumina and we think that appellant's failure to recognize that he had produced a new form, regardless of what he called it, is indicative that he never conceived the invention prior to appellees' filing date. (emphasis in original)[68]

Later, the C.C.P.A. reiterated this position in *Silvestri, supra,* stating:

This standard does not require that Silvestri estab-

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[66] Reply Brief of Plaintiff Standard Oil Company (Indiana) With Respect To Priority, p. 67 [hereinafter cited as "Standard's Priority Reply Brief"].

[67] 333 F.2d 239 (C.C.P.A. 1964).

[68] *Id.,* p. 243.

> lish that he recognized the invention in the same *terms* as those recited in the count. The invention is not the lish that he recognized the invention in the same *terms* defined. Silvestri must establish that he recognized and appreciated *as a new form,* a compound corresponding to the compound defined by the count. (emphasis in original)[69]
>
> Silvestri must establish that he recognized and appreciated *as a new form,* a compound corresponding to the compound defined by the count. (emphasis in original)[69]

Du Pont interprets *Heard v. Burton* as requiring that a party not only recognize that his product is new, but that he also appreciate enough about the product to justify the conclusion that it corresponds to the Count.[70] Phillips, on the other hand, argues that it is sufficient if an inventor merely recognize that the product, which happens to correspond to the Count, is a new form of matter.[71]

The C.C.P.A. has opted for the former test, and it is adopted here. In *Meitzner v. Corte,*[72] two years after *Silvestri,* the junior party, Meitzner, sought to establish an actual reduction to practice of a cation exchange resin described by the Count as having a "spongy structure" permeable to liquids. The C.C.P.A. held that, although Meitzner failed to mention the limitation "spongy", he would satisfy the recognition requirement if he appreciated both that his product was new and that it had the "out-

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[69] 496 F.2d 599.

[70] Opening Brief on Behalf of Plaintiff Du Pont, p. 52 [hereinafter cited as "Du Pont's Brief"].

[71] Phillips's Law Merorandum, pp. 9, 12.

[72] 537 F.2d 524 (C.C.P.A. 1976).

ward manifestations or characteristics'"[73] of sponginess. Meitzner was therefore able to satisfy the recognition without mentioning "sponginess' by proving that he appreciated that the product had: "(1) a milky, opaque to nontrasparently white appeaarnce, (2) resistance . . . to destruction upon subsequent chemical reaction, including saponification or sulfonation, and (3) the high chemical reactivity . . . relative to the corresponding resins having a gel-type structure which are produced without the addition of the organic liquid.'"[74]

Following *Meitzner v. Corte,* then this Court holds that in order to prove adequate recognition of solid crystalline polypropylene for an actual reduction to practice, an inventor need only recognize the newness of the product and appreciate enough about the outward manifestations of solidity, recurring propylene units, and crystallinity to justify the conclusion that the product falls within the Count.

The utility requirement is satisfied when an inventor has learned enough about the product to justify the conclusion that it is useful for a specific purpose. It is possible for an inventor to justify this conclusion by likening the invention to known compounds of demonstrated utility. In *Ciric v. Flanagan,*[75] when an inventor sought a patent for an ion-exchanger, the C.C.P.A. considered the fact that the invention was a form of zeolite, the ion-exchanging and absorptive properties of which were widely known and appreciated. Similarly, in *Silvestri v. Grant*[76] an inventor sought a patent for a new form of ampicillin which could be stored longer than older forms, and the C.C.P.A.

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[73] *Id.,* p. 529.

[74] 537 F.2d 529 (C.C.P.A. 1976).

[75] 511 F.2d 1182 (C.C.P.A. 1975).

[76] 496 F.2d 593 (C.C.P.A. 1974).

weighed the fact that the new form was recognized as being very similar to the old form whose utility had been well established.

Significant bench testing has generally been required to the extent that it is necessary to establish the essential properties of the product relevant to utility. For example, the C.C.P.A. required that utility for a thermal insulating foam be based on tests establishing thermal conductivity, density, and compressive strength;[77] utility for an organic photoconductor was based upon three standard tests for photoconductivity;[78] and utility for an explosive was based upon its ability to explode.[79]

This testing need only be sufficient to establish recognition of the most important properties; extensive testing of every detail of the product is not necessary. In *Steinberg v. Seitz*,[80] for example, the Board found that utility for a device for measuring blood clotting rates had been established by positive results in two coagulation rate tests. Upon appeal, the appellants argued that the Board should have required further testing including testing on a larger number of samples, especially blood samples from abnormal individuals, statistical reporting of the results, and comparison of the results with those obtained by the prior art method. In upholding the Board's decision, the C.C.P.A. stated: "We have considered these arguments, but are convinced that they are untenable. The testing which appellants contend is necessary, we believe, would be necessary for commercial refinement of the [product], but not for establishing actual reduction to practice."[81]

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[77] Voisinet v. Coglianese, 455 F.2d 1064 (C.C.P.A. 1972).

[78] Mattor v. Coolegem, 530 F.2d 1391 (C.C.P.A. 1976).

[79] Hradel v. Griffith, 367 F.2d 851 (C.C.P.A. 1966).

[80] 517 F.2d 1358 (C.C.P.A. 1975).

[81] *Id.*, p. 1363.

This position was reiterated in *Cochran v. Kresock*,[82] where the invention, a circuit for improving flesh tones in color television reception, was tested by connecting it to a color television set and observing the quality of the flesh tones. The C.C.P.A. held: "Appellant would appear to require a testing of the [product] for reliability, over a period of time, under adverse conditions. While such testing may be desirable before the circuit could be commercially introduced, such extensive testing is not required for a reduction to practice."[83]

The C.C.P.A. addressed the utility question as applied to polymer compositions in *Anderson v. Natta*.[84] In that case, Du Pont sought to rely upon the work of Anderson and Baxter, who are also involved in this case, to justify the conclusion that various plastic polymers, including polypropylene, had utility as plastic films. Du Pont claimed that manual manipulation of its product showed that it was tough, self-supporting, and flexible, and that its product had been pressed into a film suitable for infrared testing. Finally, Du Pont cited the ensuing infrared analysis and density and viscosity determinations as showing utility. The C.C.P.A. held that although these tests were relevant to the identification of the product as meeting the limitations of the Count, they were not sufficiently directed to ascertaining the utility of the product. Such rudimentary observations were especially insufficient in the absence of standard testing strength.

In the instant case, Standard, Phillips, and Montedison all introduced evidence concerning the additional testing necessary to justify the conclusion that a polymer had

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[82] 530 F.2d 385 (C.C.P.A. 1976).

[83] *Id.*, p. 391.

[84] 480 F.2d 1392 (C.C.P.A. 1973).

utility as a solid plastic.[85] Standard's Dr. Herman Mark testified that such utility could be proven if the testing cited in *Anderson v. Natta* were supplemented by further testing showing that a polymer was insoluble in xylene and that it was crystalline.[86]

Phillips's Dr. Thomas Fox testified that sold plastics was used principally for making molded articles[87] and that in order to conclude that a material was useful for making molded articles

> [Y]ou would have to know that the material is capable of being molded. You would have to know that it is going to be thermally stable [i.e. would not decompose] at the temperatures you would use to mold it.[88] You would have to know that it is at the use temperature a rigid, high [Young's] modulus. . . .[89] [Y]ou should know that you have a high molecular weight polymer 90 because very low molecular weight polymers are very often low in tensile strength, and

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[85] Phillips also claims utility for the product as a wax modified. Since Phillips is the only party claiming this utility, discussion of the testing required appears in the section of this Opinion concerning Phillips's actual reduction to practice.

[86] Tr. pp. 7072-73.

[87] *Id.*, pp. 3891-92.

[88] Tr., pp. 1097-98. Later testimony established that the molding temperature of a material is approximately fifty degrees above its melting point. Tr., p. 3148.

[89] The Young's modulus is "the force that [is required for] permanently deforming[ing] a material by stretching, bending or twisting". *Hackh's, supra* note 30 at 919; Tr., p. 771.

[90] Fox testified that a satisfactory high molecular weight was indicated by viscosity measurements in the range of 0.1 to 3.0. Tr., p. 880.

high molecular weight polymers are in general not low in tensile strength.[91]

Montedison offered Dr. Cecil Bawn and Dr. Frank Reinhart to establish a standard for utility recognition. Bawn agreed with Fox that utility testing should include the determination of the thermal stability[92] and Young's modulus,[93] but went further and insisted that it was also necessary to determine that the material "is not cracking up in the mold, . . . [that] it flows easily, . . . [that] the parts coming out are not too brittle. One has to experiment in a mold, is what it comes to, before one can say it can be molded successfully."[94] In addition, impact strength measurements are necessary.[95] If the material were to be used as a fiber, it would have to be tested for reaction to sunlight, washing, and sweat; if it were to be used as a film, it would have to be tested for wearability, tearability, flexibility and brittleness; and, if it were to be used for packaging, toxicity would have to be determined. These opinions of the required extent of testing were supported by Reinhart.[96]

The Court finds that Fox's tests are most closely related to determination of the properties relevant to the utility of a solid plastic because they measure the ability of the plastic to be molded to retain a molded shape. As the subsequent discussion shows, both of Mark's additional tests, like the infrared analysis in *Natta* v. *Anderson, supra,*

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[91] *Id.*, pp. 1097-98.

[92] *Id.*, p. 3148.

[93] *Id.*, p. 3139.

[94] *Id.*, p. 3148.

[95] *Id.*, pp. 3141-42.

[96] *Id.*, pp. 7887-7938.

were standard practice for separating and identifying a polymerization product. If these tests are adopted as sufficient to show utility, the utility requirement would melt into the production and recognition requirements. Since the Supreme Court has carefully stated tht utility is a distinct requirement of the reduction to practice,[97] this Court rejects Standard's proposed tests.

The extensive tests proposed by Bawn and Reinhart, on the other hand, are overly rigorous. The more than fifteen tests suggested by these witnesses go beyond establishing utility as a solid plastic and extend to the feasibility of commercial production. A fabric that reacts favorably to human sweat, for example, might sell better than one that does not. There could, nevertheless, still be plenty of uses, such as drapery, carpeting, window shades, or insulation, to which a fiber may be put where its reaction to human sweat is unimportant. Similarly, a plastic that readily cracks during sudden cooling after molding may be difficult to work with, but it is possible that the cooling process could be modified to avoid the negative effects. This Court therefore rejects the idea that patentable utility can be found only by following the extensive testing program proposed by Bawn and Reinhart and holds that utility of a solid plastic may be demonstrated by the successful completion of the tests proposed by Fox.

Constructive Reduction To Practice.

A constructive reduction to practice is established as of the date that an inventor files an application complying with 35 U.S.C. § 112. Section 112 provides in part:

> The specification shall contain a written description of the invention, and of the manner and process of mak-

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[97] Brenner v. Manson, 383 U.S. 519 (1966).

> ing and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same, and shall set forth the best mode contemplated by the inventor of carrying out his invention.

The requirements of a constructive reduction to practice are thus description of (1) the product; (2) a process for making it, such process being the best mode known to the inventors; and (3) the product's utility.

The requirement that the product be described is of course adequately satisfied by an application that describes the product in the same words as those used in the Count.[98] The Board apparently believed that such an *in haec verba* description was absolutely necessary.[99] Since the Board's Opinion, however, the C.C.P.A. has ruled that patent entitlement is based on scientific skill and diligence and not on the ability to manipulate English synonyms. An application will thus contain an adequate description of the product if:

> [T]he language which *is* contained in the [original] application is the legal equivalent of the [Count] language, in the sense that the *necessary and only reasonable* construction to be given the disclosure in the [original application] by one skilled in the art . . . is the same as the construction which such person would give the language in the claims of the later [Count]. (emphasis in original)[100]

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[98] Application of Smith, 481 F.2d 910 (C.C.P.A. 1973).

[99] The Board rejected Phillips's 1953 application for failing to describe "a normally solid polypropylene *consisting essentially of recurring propylene units* or having a *substantial crystalline polypropylene content.*" (emphasis in original). Board's Opinion, *supra* note 18 at p. 41.

[100] *Waggoner* v. *Barger*, 463 F.2d 1377, 1380 (C.C.P.A. 1972).

Appendix B

Legal equivalence, or inherency, may be established either by the direct meaning of the language or by inferences drawn from the terms of the initial disclosure.[101] Legal equivalence may also be proven by the use of circumstantial evidence showing successful experiments reproducing the initial application. The instant case raises the issue of what constitutes a successful reproduction experiment. Montedison and Standard[102] insist that the law requires that the product of the Count be "invariably" obtained in every attempted reproduction:

> [I]nherency 'may not be established by probabilities and possibilities.' It 'is not sufficient that a person following the disclosure might obtain the result set forth in the count; it must *invariably* happen.' Stamicarbon N.V. v. Chemical Constr. Corp., 544 F.2d 645, 652 (3d Cir. 1976).
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> Inherency does not mean that a thing might be done or that it might happen, as in the instant case, one out of twenty odd times; but it must be disclosed, if inherency is claimed, that the thing will *necessarily* happen. . . . Application of Draeger, 150 F.2d 572, 574 (C.C.P.A. 1954).[103]

The weakness of these arguments is that the *Stamicarbon* and *Draeger* cases upon which they rely involved process patents. In a process patent case, the application must disclose a functioning process. If the process is ineffectual, the disclosure must be inadquate. Therefore, the process must work every time. In a product patent

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[101] Spero v. Ringold, 377 F.2d 652 (C.C.P.A. 1967).

[102] Post Trial Brief of Plaintifi Standard Oil Company (Indiana) With Resject to Priority, pp. 163-64 [hereinfater cited as "Standard's Priority Brief"].

[103] Montedison's Brief, *supra* note 65, at p. 30

case, however, the only claim is that when the disclosed process produces a product with certain specified characteristics, that product invariably falls within the Count. The fact that the process might also produce other nonconforming products is not relevant. In *Application of Nathan,*[104] for instance, the applicant sought a patent upon steroids containing fluorine or chlorine substituents bound in a specific geometrical array known as "alpha orientation". The question was whether the original application, which failed to verbalize specifically the geometrical orientation of the fluorine or chlorine substituent, inherently specified it. The C.C.P.A. found adequate description despite the fact that the applicant did not submit any evidence that the disclosed process always and inevitably produced the required product. Rather, all the evidence was directed to showing the similarities between any resulting product that complied with the disclosure and the product described by the Count.[105]

The requirement that the besst mode of production of the invention be described is satisfied when the specification is sufficient to guide one skilled in the art to its successful application.[106] The specification need not be as detailed as a "production specification".[107] Rather, an enabling disclosure may presume the knowledge that was commonly known in theart at the time the application was filed.[108] Moreover, an enabling disclosure may require

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[104] 328 F.2d 1005 (C.C.P.A. 1964).

[105] *See also* Spero v. Ringold, 377 F.2d 652 (C.C.P.A. 1967); In re Magerlein, 346 F.2d 609 (C.C.P.A. 1965).

[106] Minerals Separation, Ltd. v. Hyde, 242 U.S. 261 (1916).

[107] Trio Process Corp. v. L. Goldstein's Sons, Inc., 461 F.2d 66, 74 (3d Cir. 1972).

[108] Application of Glass, 492 F.2d 1228 (C.C.P.A. 1974).

its readers to engage in reasonable experimentation.[109] An inventor must nevertheless disclose the best production method then known to the applicant. The purpose behind this requirement is "to restrain inventors from applying for patents while at the same time concealing from the public preferred embodiments of their inventions which they have in fact conceived."[110] A best mode attack on a patent will fail unless it is proven that the applicant intentionally concealed his knowledge.[111] It will also fail if the best mode, although not expressly disclosed in the application, is generallyknown to persons skilled in the art.[112]

[112] Application of Gay, 309 F.2d 769; *Chisum, supra* note 58, at § 7.05(3).

The requirement that the product's utility be described is mandated by case law. In *Brenner v. Manson*,[113] Manson filed a patent applicaton for a process for producing a known chemical compound whose utility was unknown. The Patent Examiner rejected Manson's application for failing to disclose any utility and was ultimately affirmed by the Supreme Court. Although the case involved the adequacy of the applicant's § 112 disclosure, the Court implicitly assumed that 35 U.S.C. § 112 incorporated 35 U.S.C. § 101,[114] which requires that patentable inventions be useful.

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[109] Lever Bros. Co. v. Proctor & Gamble Mfg. Co., 139 F.2d 633 (4th Cir. 1943); Franc-Strohmenger & Cowan, Inc. v. Arthur Siegman, Inc., 27 F.2d 785 (2d Cir. 1928).

[110] Application of Gay, 309 F.2d 769 (C.C.P.A. 1962).

[111] *Chisum, supra* note 58, at § 7.05(1).

[113] 383 U.S. 519 (1965).

[114] 35 U.S.C. § 101 provides:

"Whoever invents or discovers any new or useful process,

(footnote continued on following page)

The Court of Customs and Patent Appeasl subsequently rearticulated this interpretation of § 112 in *Application of Kirk,*[115] noting: "[S]urely Congress intended § 112 to presuppose *full satisfaction* of the requirements of § 101. Necessarily, compliance with § 112 requires a description of how to use presently useful inventions, otherwise an applicant would anomalously be required to teach how to use a useless invention."[116]

Section 112 thus requires that an application for a constructive reduction to practice discloses a specific purpose for which the invention may be used. This requirement may be met either by including utility statements within the application[117] or by introducing evidence that the reported properties of the invention were sufficient to justify the conclusion that the material wase useful for a specific purpose.[118] In the instant case, the adequacy of utility disclosure for a constructive reduction to practice only arose in the context of Phillips's application, which disclosed that its polymer was useful as a solid plastic as well as other information allegedly supporting this statement. Phillips's statement alone might be sufficient to disclose a utility. Alternatively, the utility requirement may be satisfied by disclosing sufficient information con-

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machine, manufacture, or composition of matter, or any new and useful improvement thereof ,may obtain a patent therefor, subject to the conditions and requirements of this title."

[115] 376 F.2d 936, 942 (C.C.P.A. 1967).

[116] *See also* Application of Joly, 376 F.2d 906 (C.C.P.A. 1967); Application of Gardner, 475 F.2d 1389 (C.C.P.A. 1973); Yasuko Kawai v. Metlesics, 480 F.2d 880 (C.C.P.A. 1973).

[117] Application of Gardner, 475 F.2d 1389 (C.C.P.A. 1973).

[118] Carter-Wallace, Inc. v. Riverton Laboratories, Inc., 304 F.Supp. 357 (S.D.N.Y. 1969).

cerning the product's Young's modulus, thermal stability, and molecular weight.

Montedison's Priority Case

Montedison claims two priority dates for a constructive reduction to practice: June 8, 1954 and July 27, 1954.[119] Although Montedison's application for a patent for solid crystalline polypropylene was not filed in the United States until June 8, 1955,[120] Montedison seeks the benefit of the 1954 dates when it filed applications for the same product in Italy. This relation back of the priority date of an American filing to the date of a foreign application is provided by 35 U.S.C. § 119:

> An application for patent for an invention filed in this country by any person who has . . . previously regularly filed an application for a patent for the same invention in a foreign country . . . shall have the same effect as the same application would have if filed in this country on the date on which the application for patent for the same invention was first filed in such foreign country, if the application in this country is filed within twelve months from the earliest date on which such foreign application was filed; . . .

The Board found that Montedison had fully complied with the requirements of § 119 and awarded it the senior priority date of June 8, 1954.[121] Du Pont and Phillips attack this award. This Court finds that the challenges lack merit and affirms the Board's Opinion.

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[119] Montedison's Brief, *supra* note 65, at pp. 5, 11.

[120] U.S. Patent Application No. 514,099.

[121] Board's Opinion, *supra* note 18, at p. 30.

Appendix B

Inventorship.

Du Pont first argues that the American application does not comply with the requirement in 35 U.S.C. § 111 that the "[a]pplication for patent shall be made by the inventor" because it lists Giorgio Mazzanti, Roberto Pino and Guilio Natta as joint inventors. Du Pont claims that Natta was the sole inventor and that the inclusion of the other names renders the application invalid.[122] Du Pont presented a similar argument to the Board[123] where it was rejected after extensive consideration of the facts.[124] A review of the record fails to disclose any reason to disagree with the Board that Natta, Mazzanti, and Pino were the joint inventors.

If Montedison did mistakenly join Pino and Mazzanti as inventors, the remedy would not be the automatic invalidation of its patent as Du Pont contends,[125] but rather Montedison would be afforded the opportunity to amend under 35 U.S.C. § 256, which provides:

> Whenever a patent is issued on the application of persons as joint inventors and it appears that one of such

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[122] Du Pont's Brief, *supra* note 70, at p. 86.

[123] Board's Opinion, *supra* note 18, at p. 6.

[124] *Id.*, pp. 6-31. The Board held in relevant part:

> "It is our conclusion that the record presented clearly establishes that the invention of the count which is described in Italian application U-59 was, in fact, the joint invention of Natta, Pino and Mazzanti.
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> . . . .
>
> We [therefore] conclude that Italian application U-59 filed on June 8, 1954 was filed by Montecatini as assignee of Natta, Pino and Mazzanti the joint inventors of the invention described in that application . . . . We hold, therefore, that Natta et al. are entitled to the date of June 8, 1954 for conception and constructive reduction to practice."

[125] Du Pont's Brief, *supra* note 70, at pp. 104-107.

> persons was not in fact a joint inventor, and that he was included as a joint inventor by error and without any deceptive intention, the Commissioner may . . . issue a certificate deleting the name of the erroneously joined person from the patent.[126]

The policy behind this provision is to make the amendment remedy widely available.[127] Only when errors in inventorship are intentional or fraudulent will such amendment be disallowed.[128] Du Pont has failed to adduce evidence that Montedison intentionally or fraudulently misjoined Mazzanti and Pino as inventors.

Du Pont argues that Monedison can no longer avail itself of this amendatory provision because it did not exercise the necessary diligence in seeking to amend its application. According to Du Pont, the fact that Montedison has tolerated the allegedly erroneous listing for more than twenty years indicates a lack of diligence.[129] Montedison has however exercised the necessary diligence. Soon after filing Montedison's American application, Harry A. Toulmin, Montedison's American patent counsel, investigated the inventorship three times and concluded that Montedison's application correctly identified the inventors.[130] Toulmin's finding was affirmed by the Opinion of the Board in 1971.

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[126] Even if the Patent Office had not issued the patent to Montedison, the application itself could have been amended under the similar liberal provisions of 35 U.S.C. § 116.

[127] Chisum, *supra* note 58, at § 2.04[4].

[128] *See* Patterson v. Hauck, 341 F.2d 131 (C.C.P.A. 1965); In re Schmidt, 293 F.2d 274 (C.C.P.A. 1961); John Blue Co. v. Dempster Mill Mfg. Co., 172 F. Supp. 23 (D. Neb. 1957).

[129] Du Pont's Brief, *supra* note 70, at p. 106.

[130] Inspection was made in 1956, Tr. pp. 11, 195-96; in 1957, Tr., p. 11, 200; and in 1958, D-300B.

Montedison has therefore had no reason to seek to amend its application since that time.

Best Mode

Phillips also attacks Montedison's June 8, 1954 constructive reduction to practice date, claiming, that the American application does not disclose the "best mode contemplated by the inventor of carrying out his invention" as required by 35 U.S.C. § 112.[131] Phillips concedes that Montedison's Italian applications disclosed the best mode known as of their filing dates, but contends that by 1955, when Montedison filed its American patent application, it had discovered a better catalyst. Specifically, Phillips argues that Montedison had discovered that the titanium tetrachloride ($TiCl_4$) catalyst disclosed in 1954 was inferior to a titanium trichloride ($TiCl_3$) catalyst and that Montedison's American patent application should have disclosed this improvement.

It is well established that "the critical date with regard to disclosing the best mode contemplated is the date of the filing of the application".[132] The question in this case is *which* date is critical in a § 119 setting: that of the United States filing, or that of the prior foreign filing. Phillips claims that compliance with the best mode requirement of § 112 is to be measured by the date of filing of the American application, and that Montedison's failure to disclose the $TiCl_3$ method in this application constitutes non-compliance sufficient for invalidation. Phillips bases this argument on a reading of § 119 that interprets the phrase "the same application" as meaning "the subsequent American applica-

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[131] Phillips' Brief, p. 202 [hereinafter cited as "Phillip's Brief"].

[132] Carter-Wallace, Inc. v. Riverton Laboratories, Inc., 433 F.2d 1034, 1038 (2d Cir. 1970).

tion". Phillips claims that this reading justifies the conclusion that Montedison's American patent application should have been updated. Assuming *arguendo* that Phillips's reading is correct, although the law is by no means clear,[133] Phillips's argument nevertheless ignores the clear language of the statute, which provides that the effective date of the subsequent American application is the date of Montedison's Italian filing. It is not contested that as of that date, June 8, 1954, Montedison honestly believed that its best catalyst was $TiCl_4$. Since Montedison's subsequent American application accurately disclosed what Montedison honestly believed as of that application's effective date, this Court finds that Montedison's application satisfied the best mode requirements of § 112.

Du Pont's Priority Case

Du Pont claims two priority dates: May 17, 1954 for an actual reduction to practice,[134] and August 18, 1954 for a constructive reduction to practice based upon United States Application 451,064.[135] The Board rejected Du Pont's claim for an actual reduction to practice, finding no production of the product, no recognition of the product,[136] and no recog-

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[133] *See* Tummers v. Kleimack, 455 F.2d 566 (C.C.P.A. 1972).

[134] Du Pont Brief, *supra* note 70, at pp. 13-79.

[135] *Id.*, pp. 80-84.

[136] In relevant part, the Board held:

"It is fundamental that in order to establish either conception or reduction to practice it must appear that the product includes all the limitations of the count and be appreciated by the inventor at the time it was made. Here, we do not find any evidence that Baxter et al. had even a conception of a polypropylene product having a substantial crystalline polypropylene content at the time of the above experiment. None

(footnote continued on following page)

nition of utility.[137] The Board accepted Du Pont's claim for a constructive reduction to practice, and awarded Du Pont August 19, 1954 as its earliest possible priority date.[138]

(footnote continued from preceding page)

of the reports or letters written *at that time* referred to a substantial crystalline polypropylene content . . . .

Although Anderson stated that at the time he saw the solid produced by Baxter he 'considered the possibility' of crystallinity present therein, it does not appear that this possbility was communicated to Baxter by Anderson at that time and Anderson made no written record relating to his so considering this product . . . .

Nor do we regard the testimony of Beck relative to crystallinity sufficient to establish a conception or reduction to practice by Baxter et al. on May 17-18, 1954. It is clear to us that the infrared spectrum run by Beck did not show that the product had any polypropylene crystallinity . . . We note that the sample prepared on May 17-18, 1954 was not submitted for X-ray examination until July 6, 1954, (after the Natta et al. effective filing date of June 8, 1954) which Beck stated might have been due to a lack of interest in crystallinity by Baxter. . . .

Although the testimony of Ryland and Beck indicates that sample 4427-86 (prepared May 17-18, 1954) was found to include some crystalline content (which was reported to Beck by Ryland on or about August 2, 1954, BX-38) there was no indication of the amount of crystallinity in this sample or whether it could be considered as a substantial crystalline content. . . .

Further, a reduction to practice cannot be proved *nunc pro tunc*, Searle v. Glarum et al., 37 CCPA 896, 84 USPQ 454, 457. Certainly the above exhibits do not establish that Baxter et al., in May 1954, had any conception of a product with the crystalline polypropylene content of the count."

Board's Opinion, *supra* note 18, at pp. 106-110.

[137] In relevant part, the Board held:

"We do not find sufficient evidence to establish the utility of the product prepared on May 17-18, 1954. All that was done was that the small film about 1½ inches by ½ inch was pulled on by Baxter and that he considered that the material was 'tough and elastic.' There was no indication at that time that Baxter considered it useful for any practical purpose. We cannot agree that its utility was obvious; . . . ."

Board's Opinion, *supra* note 18, at p. 111.

[138] *Id.*, p. 90.

Appendix B

After careful analysis, the Court finds that Du Pont did indeed produce, by May 17, 1954, a product meeting the limitations of the Count, but that since its inventors failed to recognize both the product and a utility for it by that date, the Board was correct in failing to find an actual reduction to practice. The Court also affirms the Board's determination that Du Pont's constructive reduction to practice was complete as claimed, and finds that Du Pont was properly awarded the benefit of August 19, 1954 as its earliest priority date.

Du Pont's Actual Reduction To Practice

Du Pont's development of crystalline polypropylene began in 1953 in the Exploratory Research Section of the Research Division of the Polychemicals Department located in Wilmington, Delaware.[139] During the relevant time period, Dr. W. F. Gresham headed the section,[140] Drs. I. M. Robinson and Arthur Anderson served as Research Supervisors,[141] and Drs. Nicholas G. Merckling, Gelu S. Stamatoff and Warren N. Baxter worked as Research Chemists.

In late 1953[142] Merckling began research aimed at "the preparation of hydrocarbon polymers of superior properties including toughness and stiffness at elevated temperatures."[143] By February, 1954 Merckling had found a German patent that disclosed a reduced titanium tetrachloride

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[139] Tr., pp. 8590-93.

[140] *Id.*, p. 8730.

[141] *Id.*, pp. 8591-92.

[142] Baxter Record, *supra* note 16, at p. 9.

[143] Du Pont Trial Exhibit No. 7. Du Pont's Trial Exhibits are hereinafter referred to by number with the prefix "D".

($TiCl_4$) catalyst useful "for the obtaining of solid polymerizates from ethylene."[144] The catalyst was made by reacting aluminum trichloride ($AlCl_3$), titanium tetrachloride ($TiCl_4$) and powdered aluminum at elevated temperatures and pressures. Using this catalyst,[145] Mereckling produced a homopolymer from ethylene which was surprisingly stiff.[146]

Following this encouraging lead, [147] Du Pont scientists began to explore the potential use of reduced metal halides such as $TiCl_4$ as catalysts for the polymerization of olefins, including proplyene.[148] By April 1954 Du Pont scientists had slightly modified the German catalyst by reducing $TiCl_4$ with various "Grignard reagents" rather than aluminum metal.[149] With this improved catalyst they produced a polyethylene having an "essentially linear structure".[150] This polyethylene was "different in that it had a much lower amount of branching in the polymer chain."[151] Robinson expected that the new catalyst could be used to produce other polymers from various olefinic compounds including propylene, which would demonstrate

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[144] D-782.

[145] D-4, p. 153.

[146] Baxter Record, *supra* note 16, at pp. 9-10.

[147] Encouragement is evidenced by Robinson's enthusiasm for Mereckling's development, which led Robinson to encapsulate the original polyethylene sample in polymethylmethacrylate, encircle it with a gold band, and use it as a paper weight. Baxter Record, *supra* note 16, at p. 51.

[148] D-1, p. 2.

[149] Baxter Record, *supra* note 16, at p. 16. Grignard reagents are discussed at Weininger, *supra* note 33, at pp. 231-33.

[150] D-2, p. 3.

[151] Tr., p. 8752.

"different structure (less branching)."[152] As early as April 22, 1954 Merckling may have realized this expectation by polymerizing what Robinson considered to be their first solid polypropylene.[153] Merckling produced too little product for further analysis, however.[154]

By May 1954 Stamatoff and Baxter had joined the olefin polymerization project,[155] and on May 5, 1954 Stamatoff obtained a small amount of solid polymer, which he asaumed was polypropylene.[156] Although the sample, containing about ".1 to .2 grams" of polymer,[157] was again too small to analyze,[158] certain gross characteristics were observed: the sample was "solid polypropylene, and it was flexible",[159] and it had a stick temperature[160] greater than 122°F. (50°C.) to 167°F. (75°C.)[161]

Then, on May 17, 1954 Baxter conducted Run 4460-41[162]

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[152] D-2, p. 2.

[153] D-5, p. 16.

[154] Baxter Record, *supra* note 16, at pp. 60-61.

[155] D-36, p. 115.

[156] D-36, p. 115.

[157] *Id.*

[158] Baxter Record, *supra* note 16, at p. 246.

[159] *Id.*, p. 247.

[160] Stamatoff defined "stick temperature" as "the temperature at which the polymer can be still removed from the beaker or watchglass without having to break the watchglass. In other words, it is the temperature at which the polymer does not stick on the watchglass in which it is dried." *Id.*, pp. 249-50.

[161] *Id.*, pp. 246-47 and 250.

[162] "4460" refers to the notebook number and "41" refers to the page upon which it was first recorded. D-28, p. 41. Since different parts of this experiment were recorded in different places, scientists used several different numbers, including 4427-86, to designate it. For simplification, the Court will refer to this run as "4460-41".

and produced the product upon which Du Pont premises its claim for an actual reduction to practice. Baxter began this Run on May 11, 1954 when he prepared a catalyst by mixing six grams of $TiCl_4$, forty milliliters (mls.) of phenyl magnesium bromide and 200 mls. of cyclohexane. The resulting solid catalyst was then separated from liquid cyclohexane by filtration under an atmosphere of nitrogen gas,[163] and stored for subsequent use. On May 17, 1954, Baxter charged a stainless steel linked Shakertube[164] with three grams of the catalyst, 100 mls. of cyclohexane, and 50 g. of propylene. The reaction proceeded for two hours at a temperature of about 86°F. (30°C.). The product was then removed from the reactor and washed from the catalyst with toluene.[165] Baxter then dissolved as much of the crude product as he could in methanol, hydrochloric acid, and acetone, and dried the residue in an oven at 150°F. (70°C.).[166] Careful analysis clearly and convincingly shows, despite the finding of the Board, that the 0.5 g. of resulting polymer satisfied the three limitations of the Count, although Du Pont's scientists did not recognize what they had nor did they sufficiently prove the utility of their product.

1. Production of The Product of The Count.

The first evidence that the product of Run 4460-41 was *normally solid* was an entry in Baxter's Notebook describing it as "solid polypropylene" and further de-

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[163] D-27, p. 71.

[164] The Court understands that the term "Shakertube" describes what is usually known as a shaker autoclave.

[165] D-28, p. 41.

[166] D-27, p. 86.

scribing it as "tough" and "elastic".[167] This description is supported by Baxter's testimony at trial, where he remembered:

> The film was solid, it was tough, it was translucent, it wasn't sticky, it was slightly elastic in that when I gripped the ends with my fingers and pulled it, it might extend a little bit, perhaps 5 percent, and then recover.[168]
>
> . . . .
>
> The solid polymer I then pressed into a film that was a tough film, it was flexible, elastic, it was translucent in appearance.[168]

Anderson testified that this film resembled a "rigid, tough plastic",[170] and that it was non-tacky.[171] Michael Beck, who subjected this material to infrared analysis for Du Pont, remembered that this film appeared "hard".[172] The Court finds that this evidence is sufficient to establish that the product met the first limitation of the Count.

Analysis of available infrared spectra convinces the Court that the product of Run 4460-41 was *polypropylene, consisting essentially of recurring propylene units.* Infrared absorption over the range of two to fifteen microns was measured and recorded on May 18, 1954 by Beck,

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[167] *Id.*

[168] Tr., p. 8216.

[169] *Id.*, p. 8306.

[170] *Id.*, p. 8882.

[171] *Id.*, p. 8827. Robinson also recalled that "[T]he polymer that Baxter obtained was quite flexible, but tough . . . was flexible, tough, off-white, thin and small . . . [I]t was elastic." Baxter Record, *supra* note 16, at p. 30.

[172] Baxter Record, *supra* note 16, at p. 1592.

producing scan D-35. At trial, Dr. Edward Brame testified that he had analyzed this scan and found bands at wavelengths near 7.25, 8.6, 10.03, 10.27, and 11.85 microns, and no absorbance peaks at 13.7 microns or 13.9 microns.[173] On the basis of this information, Brame concluded "that this was a homo-polymer of propylene."[174] Brame also concluded that although there were some possible signs of head-to-head[175] and tail-to-tail[176] polymerization, the scan showed "primarily the structure of propylene polymerized head-to-tail".[177]

Brame also testified that he noted absorptions at 13.3 to 13.35, 13.75, 13.95, 14.4 and 15.03 microns, and that these absorptions were "not associated with the fundamental chain structure of the polypropylene."[178] Upon further investigation, he attributed these absorptions to the presence of trace amounts of the catalyst, which had contained chloride and phenyl groups,[179] and dismissed

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[173] Tr., pp. 9110-11.

[174] *Id.*, p. 9111.

[175] This was indicated by the appearance of a slight absorbance "shoulder" at 8.95 microns. Tr., p. 9171.

[176] *Id.* This was indicated by the absorbance at the 13.3 micron range.

[177] Tr., pp. 9172-73.

[178] Tr., pp. 9128-29.

[179] Brame used a computer to search data files of the American Society of Testing Engineers (ASTM) for compounds exhibiting similar spectra:

> "The Sadtler Research Laboratory in Philadlphia has a file of roughly 100,000 spectra that they have published commercially now for some twenty-odd years, maybe longer, twenty-five years. They have quite a large collection, the largest of any of the collections.

(footnote continued on following page)

the possibility that these absorbances indicated that the product was a copolymer of propylene and ethylene.[180] Since the accuracy of Brame's conclusions are not contested, the Court adopts them as true and finds that Run 4460-41 produced a homopolymer of propylene having primarily head-to-tail polymerization that satisfied the second limitation of the Count.

That the product of Run 4460-41 had a *substantial crystalline polypropylene* content was proven by testimony of Brame and also by analysis of x-ray scans and other physical testing data. Brame further analyzed scan D-35, at trial. Following a method first described by Dr. W. Heinen for determining the crystallinity of propylene samples,[181] Brame compared infrared absorptions at 11.85 microns indicating the number of propylene units in the crystalline lattice and at 8.6 microns indicating the total number of propylene units in this sample. In this manner

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(footnote continued from preceding page)

> In addition to them, Coblentz has a nice, small but nice file of model compound spectra.
>
> And the Aldrich Company has a compilation of infrared spectra.
>
> There are miscellaneous from the literature, from various sources, but they are all contained within the ASTM. The ASTM has been in the business of doing this for a number of years."

Tr., p. 9138.

The first spectrum that Brame found, D-794, was of a compound containing bi-phenyl. This spectrum showed absorptions, corresponding in size and shape to those in the 13.75 and 14.4 micron ranges on D-35. Tr., p. 9140. The other spectra, D-795, were for alkyl chloride compounds. All of these spectra showed absorptions, corresponding in size and shape to those in the 13.3 to 13.35 and 13.95 and 15.03 micron ranges on D-35. Tr., pp. 9144-51.

[180] Tr., pp. 9175-76.

[181] D-784.

he estimated that the product of Run 4460-41 was about 28% crystalline.[182]

The presence of crystallinity was confirmed by x-ray analysis. On July 7, 1954 Dr. A. Ryland prepared an x-ray photograph, D-46. The appearance of crystalline diffraction maxima on the photograph indicated that the polymer was partially crystalline. The diffraction maxima were "represented by the relatively sharp circles which are apparent on this film, as contrasted to the rather diffuse blackening of the film which is characteristic of an amorphous portion of the polymer".[183] Ryland subsequently informed Beck that Baxter's product was partially crystalline.[184] On August 2, 1954 she reported: "standard pattern taken for our files",[185] and later testified: "The fact that I have referred to a standard pattern of this material indicates to me that I detected discrete diffraction maxima since I would not have used that terminology to refer to an amorphous material."[186] Ryland compared scan D-46 to x-ray pictures of polythylene and other polymers and concluded that the new scan showed a "diffraction pattern which was distinctly different from that of any of the other polymers in our files."[187] In her testimony before the Board, Ryland re-examined the x-ray diffraction pat-

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[182] Brame estimated that the height of the 11.9 micron peak was 0.180 units and the height of the 8.6 micron peak was 0.603. Tr., p. 9123. The ratio of the former to the latter was 0.2985, which, according to Figure 2 of Heinen's article, corresponded to 28% crystallinity. *Id.*, p. 9117. Brame's calculations are contained in Exhibit D-790.

[183] Baxter Record, *supra* note 16, at p. 2607.

[184] *Id.*, p. 2617.

[185] D-44.

[186] Baxter Record, *supra* note 16, at pp. 2621-22.

[187] Baxter Record, *supra* note 16, at p. 2609.

terns. She measured the interplanar spacings represented on those patterns and concluded that the partial crystallinity demonstrated by the product of Run 4460-41 was of the propylene type.[188]

Crystallinity was also confirmed by density and softening point measurements made of the product of Run 4460-41. In September 1954 Baxter reported that his polymer had a density of 0.88g./cm.3.[189] In addition, Baxter reported in a June 17, 1954 memorandum to Gresham that the product of Run 4460-41 had a transition temperature, which Baxter called a "softening point", of 150°C. (302°F.)[190] These numbers are within the range of values normally associated with crystalline polypropylene.[191]

2. *Recognition of The Product.*

Recognition of the product for the purpose of establishing an actual reduction to practice is established by appreciation that the product is a new form, and knowledge of sufficient of its properties to justify the conclusion that it corresponds to the compound defined by the Count. Baxter clearly recognized by May 1954 that he had made a new product:

> Q. Well, do you recall what if any significance there was to you then in mid-May 1954 from this polypropylene film [from Run 4460-41] after you had made it and examined it?
>
> A. I recall that I thought it was significant that I had made a new, solid polypropylene, and to my

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[188] *Id.*, p. 2618.

[189] D-33, p. 3.

[190] D-32, p. 2.

[191] *See* text accompanying note 178, *supra.*

knowledge solid polypropylene had not been made previously. . . .[192]

Du Pont knew or appreciated very little else about its product prior to Natta's priority date of June 8, 1954. It has not been established that the 302°F. (150°C.) transition temperature was measured before June 17, 1954. An x-ray picture was not prepared until July, 1954. The infrared scan was not thoroughly analyzed until August, 1954, and an accurate estimate of density was not made until September, 1954. Although Du Pont did ultimately obtain this information, it cannot be used to retroactively supplement an otherwise inadequate recognition.

Du Pont's recognition that the product of Run 4460-41 was *normally solid* is adequately demonstrated by the contemporaneously recorded observations of the scientists who first saw Du Pont's polymer.[193] Since no party has challenged the adequacy of this evidence, the Court finds that Du Pont recognizeed enough about its product to justify the conclusion that it complied with the Count's first limitation.

As noted above, scan D-35, prepared on May 17, 1954, contained enough information to establish that Baxter's product was a *polypropylene consisting essentially of recurring propylene units.*[194] The recognition requirement, however, cannot be satisfied by merely obtaining a diffraction scan, be it x-ray or infrared. The inventor must also focus his attention on the critical peaks in each scan. In *Langer v. Kaufman*[195] for instance, the alleged inventor, Tornqvist, subjected the sample to x-ray testing. His machinery traced diffraction patterns and printed photo-

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[192] Tr., p. 8217.

[193] *See* text accompanying notes 167-172, *supra.*

[194] *See* text accompanying note 173, *supra.*

[195] 465 F.2d 915 (C.C.P.A. 1973).

graphs that were sufficient to show that the product fitted within the count. Since he failed to produce any evidence that he appreciated the importance of particular peaks, however, the C.C.P.A. held that there was no recognition of the product.

In the instant case, Beck testified before the Board that immediately after preparing infrared scan D-35, he identified certain absorption bands as being possibly correlated with known vibration modes and made notes to this effect on the scan itself.[196] Beneath the near 8.6 micron peak, he wrote:

isolated internal
methyl groups
R—CCC—R
|
C

and beneath the 10.27 micron peak, he drew an arrow. Beck informed Baxter of these observations and confirmed them in writing on May 21, 1954: "Spectrum scanned 2-15 microns. Spectrum shows strong absorption at 7.25u [microns] (methyls). Band at 8.69u [microns] may be due to isolated internal methyl groups (R—CCC—R).[197]
|
C

At trial, Baxter testified that he had expected his product to evidence characteristics consistent with the second limitation of the Count:

> I expected it would be a linear molecule, that is, the carbon atoms in the backbone would be joined together in the chain with a methyl group pendant from every other carbon atom, and that this polymerization would have taken place in a head-to-tail manner at the num-

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[196] Baxter Record, *supra* note 16, at p. 1598.

[197] D-29.

ber 1 and 2 positions of the propylene molecule where the double bond is located.[198]

He also testified that Beck's report confirmed these expectations,[199] and that he probably "wrote down the structure on a piece of scrap paper, but . . . did not write it down to preserve it to this day".[200]

Careful analysis of this testimony shows that Du Pont failed to adduce even a preponderance of the evidence that its scientists recognized enough about their product by late May 1954 to justify the conclusion that it was composed essentially of recurring propylene units. Although Beck might have recognized the three peaks at 7.25, 8.6 and 10·27 microns indicative of the presence of recurring propylene units, he did not note the peak at 10.03 microns, and failed to remark on the absence of peaks at 13.7 and 13.9 microns. The mere presence of the three observed peaks without recognition of the other critical peaks is insufficient to justify the conclusion that a polymer is composed essentially of recurring propylene units. The Court can give little weight to Baxter's testimony that he recognized the second limitations, unsupported as it is, by a shred of documentary evidence. The Court therefore cannot find that he or anyone else at Du Pont appreciated enough about their polymer to justify the conclusion that it conformed to the Count's second limitation.

In seeking to show that its scientists recognized enough about their product by May 17, 1954 to justify the conclusion that it had a *substantial crystalline polypropylene content,* Du Pont relies principally upon Anderson. He testified that he had expected Baxter's polymerization to produce a rubbery product similar to polyisobutylene but

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[198] Tr., pp. 8217-18.

[199] *Id.*, p. 8220.

[200] *Id.*

upon examining the non-tacky results of Run 4460-41, had found that it more closely resembled crystalline polyethylene.[201] Anderson further stated that he was not surprised when he later learned that Baxter's product was crystalline:

> [T]he properties were of such a nature that it would have been more surprising had it not been crystalline. . . .
>
> It was my understanding at that time that the crystal forces would tend to hold the polymer molecules together so that it would be more difficult to allow them to slip by each other when stretched or bent or otherwise subjected to physical deformation.
>
> As a consequence of this, a crystalline material will always be stiffer and usually higher melting or higher softening than a material that is not crystalline having the same structure.[202]

Anderson's trial testimony, however, conflicts with an earlier statement of his:

> I cannot honestly say that I remember having made a comparison between this film and polyethylene. It may well be that I did so, but I do not recall it now. . . . [A]t the time this testimony was taken I stated that the film tended to resemble polyethylene. But it does not indicate that I made this comparison mentally back at the time that I was shown this film. I still cannot honestly testify that I recall having made the comparison at that time. It is undoubtedly true that this entered my mind at that time, but I don't recall it.[203]

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[201] Tr., pp. 8826-27.

[202] Tr., pp. 8837-38.

[203] *Id.*, pp. 8923-24.

Appendix B

The Court also rejects Anderson's testimony because of the lack of corroborating documentary evidence. It is illogical to believe that anyone who discovered a new product and realized that its distinguishing feature was its crystalline nature would fail to record that realization. More likely, Du Pont's scientists were unwilling, without the x-ray testing and further infrared analyses which they subsequently carried out to conclude that Baxter's product was crystalline.

Dr. Paul J. Flory testified that a polymer might be either tough and elastic and therefore crystalline, or rubbery and therefore amorphous.[204] The Court is reticient, however, to hold that observations that a material is tough and elastic but not rubbery, is sufficient to justify the conclusion that the product is crystalline, especially when such observations are based solely on manual manipulation. For example, Baxter used the words "tough", "elastic", and "rubbery" to describe the same product—polybutadiene.[205] Apparently the qualitative observations of Du Pont's scientists were not intended to carry the meaning that Flory sought to extract from them.

Du Pont also notes that when Baxter first made his polymer it appeared as a granular powder, and when dried overnight at 150°F.(70°C.) remained granular. Flory testified that this indicated:

> [T]hat the melting [or softening] point of this polymer was above the temperature of the oven, 70 degrees Centigrade. Otherwise the polymer would have been—the particles of the powder would have coalesced and have formed a sticky mass. So it must have

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[204] Tr., pp. 9480-81.

[205] *Cf.*, D-32, pp. 2-3, with D-33, p. 5.

had a [. . . transition] temperature above that of the oven. . . .[206]

Since all previously produced polypropylenes were amorphous and softened below 158°F.(70°C.),[207] Flory assumed that the distinguishing feature that raised the transition point of Baxter's product was the presence of crystallinity.[208] This argument presumes that Baxter's product was polypropylene, a conclusion that could not have been justified by the data available to Du Pont prior to Natta's priority date.[209] Since there are many substances with melting points higher than 158°F.(70°C.), the mere fact that a product falls into this category is not a sufficient ground for the conclusion that it is solid crystalline polypropylene.

Finally, Du Pont noted that Baxter made a preliminary determination of the density of his polymer prior to Natta's June 8, 1954 date and recorded that it was "less than 0.89" g./cm.³.[210] Since Du Pont did not offer any evidence that this datum would justify the conclusion that the material was crystalline, the Court will not hold otherwise. Accordingly, this Court concludes that Du Pont's scientists failed to appreciate enough information to justify the conclusion that Baxter's product was crystalline polypropylene.

3. Recognition of A Utility for The Product.

Du Pont offers three principle witnesses in an attempt to prove that its scientists recognized enough about the

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[206] Tr., p. 9488.

[207] Tr., p. 9476.

[208] *Id.*, p. 9488.

[209] *See* text accompanying note 194, *supra.*

[210] D-27.

product of Run 4460-41 by May 17, 1954 to conclude that it had utility as a solid plastic. Baxter indicated that he believed his product "could be converted into an article such as a film".[211] Anderson concluded that Baxter's product was a "novel and useful polymer"[212] and believed that the product was similar to polyethylene which he knew was used for "coating wire as insulation, for extrusion into film, and for making molded objects".[213] Flory testified that it was widely known in 1954 that semi-crystalline polymers were useful for "a whole array of uses [including] molding materials, insulation, films, and if sufficiently highly crystalline and high melting, especially fibers."[214]

Du Pont in effect seeks to premise its utility argument upon the same type of information rejected in *Anderson v. Natta*[215] as insufficient to demonstrate utility. Du Pont did not introduce evidence of testing to determine thermal stability, Young's modulus, or tensile strength. Since these tests are necessary to support the conclusion that the polymer can be used as a solid plastic, the Court finds that Du Pont did not have sufficient information to show utility. Therefore, the Board's determination that Du Pont did not recognize utility is affirmed.

Du Pont's Constructive Reduction to Practice.

The Board awarded Du Pont the date of August 19, 1954 for a constructive reduction to practice. Montedison has challenged this award on the ground that Du Pont's application failed to set forth the best mode contemplated by

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[211] Tr., p. 8222.

[212] *Id.*, p. 8835.

[213] *Id.*, p. 8828.

[214] *Id.*, p. 9485.

[215] *Supra*, note 84.

the inventors for carrying out their invention.[216] Specifically, Montedison claims that Du Pont's scientists failed to disclose the best catalyst known to them at the time of filing. Du Pont's patent application disclosed a catalyst composed of $TiCl_4$ and a reducing agent such as phenyl magnesium bromide,[217] LiA1 (n-hexyl)$_4$,[218] or tetrabutyl tin.[219] Montedison insists that at the time of filing their application Du Pont's scientists knew that LiA1 (Butyl)$_4$ was a more efficient reducing agent than those reported in the application. Montedison points to a September 2, 1954 memo from Robinson to Gresham that discusses the success of LiA1 (Butyl)$_4$ without mentioning the reducing agents listed in the patent application,[220] and also to a December 16, 1954 report by Robinson that "the most efficient catalyst employed thus far is that obtained from the action of LiA1(Butyl)$_4$ or $TiCl_4$".[221] Montedison further contends that Du Pont based Example 3 of its application on one of Baxter's experiments, but in order to disguise the fact that the more effective LiA1(Butyl)$_4$ had been used, intentionally reported the use of LiA1(n-hexe1)$_4$.[222] The September

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[216] Montedison's Proposed Findings of Fact and Conclusions of Law Nos. 533-539, pp. 201-03 [hereinafter "Montedison's Findings of Fact"].

[217] D-11, Examples I and IV.

[218] *Id.*, Examples II and III.

[219] *Id.*, Example V.

[220] M-1238.

[221] D-269, p. 2.

[222] Du Pont had little opportunity to answer these accusations. Montedison initially faied to include them in the July 1, 1977 Pre-Trial Order because, according to Montedison, it was unclear that these accusations could be addressed in a § 146 proceeding until the early 1978 decision in Weil v. Fritz, 572 F. 2d 856

(footnote continued on following page)

memo, however, fails to support Montedison's case because it has not been established that Robinson performed the underlying work prior to August 19, 1954. More importantly, the memorandum only discusses ethylene, not propylene, polymerization. Since Montedison has made no showing that information regarding etylene polymerization is directly applicable to propylene polymerization, the Court finds that the memo is insufficient to prove that Du Pont knew of a better propylene catalyst.

The December report also lends but little support to Montedison's case since it concerns work performed during the period between August 30, 1954 and September 28, 1954. Since Montedison has failed to show that any of the work discussed in Robinson's memo and report was done prior to the reported dates, this Court finds that Du Pont learned of the superiority of $LiAl(Butyl)_4$ only after filing its application on August 19, 1954.

Finally, Montedison has failed to show that Du Pont's Example 3 was modeled on Baxter's ($LiAl(Butyl)_4$ experiment or that this example was changed to disguise the use of $LiAl(Butyl)_4$. The only evidence claimed by Montedison to establish this modeling was testimony by Robinson.[223] He testified, however, that he did not know whether or not Example 3 had been based on earlier

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(footnote continued from preceding page)

(C.C.P.A. 1978). In its Brief, *supra* note 65, p. 94, Montedison mistakenly claimed that the second example, not the third in Du Pont's patent application was the one that failed to correspond to the laboratory work upon which it was based. Montedison finally presented its argument against the third example in its Reply Brief, *supra* note 65, at p. 14, too late for Du Pont to respond in its Reply Brief which was due the same day. This Court has not requested additional briefing since its careful study of the record has been sufficient to show the untenable nature of Montedison's arguments.

[223] Montedison's Reply Brief, *supra* note 65, at p. 41.

Baxter experiements that had employed $LiAl(Butyl)_4$.[224] Moreover, Robinson specifically denied that "there was a conscious decision at Du Pont in August of 1954 to specifically exclude reference to lithium aluminum tetrabutyl catalyst", in Du Pont's August 1954 patent application.[225]

Without disclosing the legal basis for its objections, Montedison finally faults Du Pont's application for failing to disclose adequately the "vital catalyst ratio information"[226] relating to the amounts of $TiCl_4$ and reducing agent to be used in preparing the catalyst for each experiment. Montedison claims that Du Pont did not disclose this ratio in Example 4 and intentionally changed the Example 2 ratio from the one used in the run upon which which Example 2 had been based. If Montedison's argument here is that Du Pont's application does not enable the production of crystalline polypropylene, this Court rejects it. Robinson's testimony indicates that Du Pont's patent application would have enabled a "chemist skilled in the art" to "make polypropylene. He would be able to run any one of a number of possible ratios. In fact that is what I would do in the laboratory."[227] If, on the other hand, Montedison's argument is that Du Pont's application failed to teach the best mode, it must also be rejected since Montedison failed to prove not only that the catalyst ratio disclosed by Du Pont was inferior to any other, but also that Du Pont's scientists appreciated any differences that might have existed. This Court therefore affirms the Board's Opinion awarding Du Pont a priority date of August 19, 1954.

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[224] Tr., pp. 12384-86.

[225] *Id.*, p. 12386.

[226] Montedison's Reply Brief, *supra* note 65, at p. 41.

[227] Tr., p. 12384.

Appendix B

Standard's Priority Case

Standard claims several priority dates: September, 1950 and April-July 1953 for actual reductions to practice, and October 15, 1954 for a constructive reduction to practice based upon United States Application No. 462,480.[225] The Board rejected Standard's first two claimed dates, finding no production of the product, no recognition of the product[229] and no recognition of utility.[230] The Board determined, however, that Standard's application supported the

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[228] Standard's Priority Brief, *supra* note 10_2, at pp. 7-44.

[229] The Board held:

> "There was no appreciation or even mention at that time that [Doty's] infrared scans show *crystallinity of the products*. . . .
>
> . . . .
>
> No quantitative measure of the proportion of crystallinity in the [P-1 and P-9] samples was made. Kimball who ran the X-ray diffraction pattern testified . . . that he could not exclude the presence of amorphous ethylene-propylene copolymer and also the presence of crystalline ethylene-propylene copolymer on the basis of these scans, depending upon the amount. . . . There was no identification of the sample of polypropylene said to have been made by Peters that was shown [to Standard's Professor Mark] on December 11, 1953. [Professor Mark] also stated that an X-ray diagram was shown to him at that time but this was not identified with any Peters run and was not submitted as an exhibit in the Zletz record . . . ." (emhasis in original). Board's Opinion, *supra* note 18, at pp. 84-86.

[230] The Board held:

> "Since Zletz has not shown utility for his products we hold that there has been no reduction to practice. We fail to see that the utility of the product of the count would be obvious. According to the assertions of the Zletz brief . . . the party Zletz was the first to produce and characterize this material. Since the material was assertedly up to then unkonwn, . . . there would be no reason that the polypropylene of the count should have the utility of crystalline polyethylene. . . ." *Id.*, p. 86.

Count and awarded it a date of October 15, 1954 as its earliest priority date.[231] Careful consideration leads this Court to affirm the rulings of the Board's award of the priority date of October 15, 1954 to Standard.

Standard's Actual Reduction to Practice.

Standard's development of crystalline polypropylene began in its Exploratory Research Division in Whiting, Indiana.[232] During the relevant time, Dr. Bernard Evering served as a Group Leader in this Division,[233] and Zletz,[234], Carmody[235] and Peters [236] worked in Evering's group as research chemists.

In June, 1950 Zletz began to study polymerization catalysts with which he had previously worked very little.[237] On or about June 15, 1950 Zletz realized that catalyst containing molybdenum oxides supported on an alumina base that had been reported as suitable for the production of ring compounds from ethylene might be used to polymerize olefins.[238] Between July 18 and 20, 1954 Zletz successfully employed such catalysts to polymerize ethylene.[239] Zletz then turned his attention to "other

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[231] *Id.*, p. 71.

[232] Tr., p. 5314.

[233] *Id.*, pp. 5308-9.

[234] *Id.*, p. 5308.

[235] *Id.*, p. 5985.

[236] *Id.*, p. 5989.

[237] *Id.*, pp. 5309-10.

[238] *Id.*, p. 5310. Standard's Trial Exhibits No. 1, pp. 45-46. Standard's Trial Exhibits will hereinafter be referred to by number with the prefix "S".

[239] *Id.*, pp. 5338-39; S-1, pp. 64-70.

olefins", proposing the polymerization of propylene.[240] Between August 11, 1950 and September 27, 1950 Zletz conducted at least six experiments aimed at polymerizing propylene.

It appeared at trial that Standard did not rely upon any of these runs for an actual reduction to practice because "they [were] totally uncorroborated. . . . Nobody was with Zletz when he made [them]".[241] One may argue, however, that Standard's Brief takes an opposite position.[242] This Court has accordingly investigated Zletz's runs and has determined that Zletz's polymers did not meet the limitations of the Count. Since Zletz's runs produced products that were no more satisfactory than those of Carmody,[243] the Court will focus its attention solely upon the Carmody products.

Carmody's work began on July 21, 1950 when he repeated one of Zletz's ethylene polymerization experiments.[244] Carmody subsequently turned to the polymerization of propylene, substituting a cobalt molybdate catalyst for the molybdenum oxide catalyst used by Zletz. Standard relies for an actual reduction to practice upon two of these experiments, designed Runs EP-34 and EP-35, conducte on September 28 and 29, 1950.[245]

In Run EP-34 Carmody placed fifty grams of cobalt

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[240] *Id.*, p. 68.

[241] Tr., p. 5357.

[242] Standard's Priority Brief, *supra* note 102, at pp. 7-38.

[243] *Compare* S-7, S-79, Zletz Record, *supra* note 16, at p. 3999, and Tr., pp. 7595, 7607 and 7614-16, with text accompanying note 244, *infra*.

[244] Tr., pp. 5660-64.

[245] Standard's Priority Brief, *supra* note 102, at pp. 14-19.

molybdate catalyst in a 100 ml. "rocker bomb".[246] He activated the catalyst by heating it to 850°F. (455°C.) and twice exposing it to hydrogen at 400 psi for a period of seventy-five minutes.[247] He next placed 49.5 g. of xylene and 20.4 g of propylene in the reactor which he subsequently heated to 302°F. (160°C.) under pressures of up to 420 psi. After about three hours, he poured the xylene solvent and much of the polymer product from the reactor. Carmody added methyl ethyl ketone,[248] an anti-solvent, to this solution, and filtered out 0.6 g. of the resulting precipitate product.[249] Carmody subsequently boiled the catalyst in xylene, again added methyl ethyl ketone to the resulting solution, and recovered another 0.1 g. of product.[250]

In EP-35 the same procedures were followed, with the exceptions that the pre-wash product yield was 20.4 g., the final separated product weighed 1.13 g. Carmody later recovered an additional 2.7 g. of product from the catalyst.[251]

In addition to Carmody's runs, Standard also relies upon two experiments performed by Peters, designed P-1 and P-9, and begun on April 30 and July 17, 1953, respectively. Peters had worked on a number of polymerization experiments along with Zletz and Carmody from 1950 through 1952.[252] During the summer of 1952 Evering

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[246] The Court understands that the term "rocker bomb" describes what is usually known as a shaker autoclave reactor.

[247] S-11, p. 44; Tr., pp. 5708-09.

[248] Tr., p. 5743.

[249] S-11, p. 44; Tr., p. 5743.

[250] S-11, p. 44; Tr., pp. 5743-44.

[251] S-11, p. 45.

[252] Tr., pp. 4590-608.

asked him to collect and organize the work of Zletz. Carmody, and others,[253] and a draft report[254] was completed in April, 1953.[255] As a result of this research, Peters came to believe that an increased quantity of product could be obtained by carrying out the polymerization at a lower temperature for a longer period.[256] He effected these changes in Runs P-1 and P-9[257]

Run P-1 began on April 30, 1953 when Peters placed in a rocker bomb 189 g. of cobalt molybdate catalyst which was activated by heating to 805°F. (429°C.) and thrice exposing it to hydrogen at pressures ranging between 200 and 500 psi.[258] On May 4 he placed between sixty-five and seventy-one grams of propylene in the rocker bomb. Peters raised the reaction pressure to about 160 psi[259] and left the reactor sitting at room temperature from May 4 to June 1, 1953. He then removed the catalyst and the polymer, which had adhered tightly to the catlyst. Peters tried to separate them by dissolving the polymer in benzene, and when this proved unsuccessful, he finally undertook the more extreme measure of crushing the catalyst and polymer and boiling them in xylene.[260] The polymer eventually dissolved and in a series of further separations Peters recovered a variety of products, in-

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[253] Tr., pp 4609-09.

[254] S-132.

[255] Tr., pp. 4609-10.

[256] *Id.*, p. 4625.

[257] S-38, p. 1.

[258] *Id.*, pp. 1-2.

[259] S-38, pp. 4-5.

[260] *Id.*, p. 9.

cluding 7.0 g. of a product precipitated "from boiling xylene solution when cooled to room temperature".[261]

Run P-9[262] was performed between July 17 and July 24, 1953. Peters used 415 g. of the same catalyst in a fixed bed reactor.[263] The hydrogen exposure was conducted at a pressure of 800 psi. The feed was composed of a mixture of 1026 g. of propylene and 638 g. of xylene, and the reaction was carried out at a pressure between 300 and 600 psi, and at a temperature between 205°F. (91°C.) and 260°F. (127°C.). The product dissolved in xylene was removed continuously in a series of twelve cuts, made between 4.25 hours and four days after the initial feed. Peters separated the product from the xylene. He combined cuts one through seven and obtained 4.6 g. of product, and combined cuts eight through twelve and obtained 2.9 g. of product.

The Court's analysis reveals that the products of Runs EP-34 and EP-35 and P-1 and P-9 do not support Standard's claims for actual reductions to practice. Although Carmody's products may have been solid and may have contained a substantial crystalline component, they were not composed essentially of recurring propylene units, they were not recognized as meeting the Count, and further, no utility was recognized. Although Peter's products did meet the Count and he recognized enough about the product of P-1 to justify such a conclusion, he failed to recognize enough about his products to establish utility.

1. Production of The Product of The Count

All the products of Standard's four runs were *normally solid.* Carmody recorded that Run EP-34 yielded a "solid

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[261] *Id.*, p. 12.

[262] S-38, pp. 31-39, 46-48.

[263] *Id.*, p. 26.

product that was rubbery, non-tacky",[264] and that Run EP-35 yielded 1.13 g. of a precipitated "solid" that was "somewhat sticky to touch".[265] Peters recorded that the combined product of Run P-1 was "solid-non-tacky, tough and flexible",[266] and that this product was fashioned into an "extremely tough and stiff film 1/8" thick".[267] At trial, he testified that "it is a molded piece, much like the polyethylenes that we made as far as being a solid material that you could mold into objects, or so forth. . . . you could bend it, and pull it, work with it."[268] Peters also recorded that both of the products from Run P-9 were "solid".[269]

In attempting to establish that the products of Runs EP-34 and EP-35 were *polypropylenes, consisting essentially of recurring propylene units,* Standard relied principally upon the Zletz record, the deposition testimony of Drs. Raymond R. Hopkins and Paul M. Doty, and the live testimony of Dr. Jack L. Koenig. Hopkins testified that he had subjected samples of the products of Runs EP-34 and EP-35 to infrared analysis in October 1950 and had produced scans S-91, S-92 and S-93 for EP-34 and the partial scan S-95 for EP-35.[270] Hopkins again tested EP-35's infrared absorption on June 18, 1953, producing scan S-76.[271] These scans showed absorption near 7.25,[272] 8.6,

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[264] S-11, p. 44; Tr., p. 5744.

[265] S-11, p. 45; Tr., p. 5803.

[266] S-38, p. 12.

[267] *Id.*, p. 13.

[268] Tr., p. 4675.

[269] S-38, pp. 63-64.

[270] Tr., p. 6134-54.

[271] *Id.*, p. 6193.

[272] S-95 only traced absorption between 7.6 and 15 microns, and did not therefore show absorption at 7.25 microns. Tr., pp. 7319-20.

10.03, 10.27 and 11.85 microns. Doty's testimony generally supported Hopkins's observations,[273] although Doty also noticed absorptions at 13.7 and 13.9 microns indicative of methylene chains.[274] Doty dismissed the importance of these peaks, however, testifying that they had "almost vanished" and that "the amount of polymethylene[275] structure had been reduced to an insignificant component".[276]

Koenig also recognized these methylene absorptions but dismissed them as insignificant since the methylene to methyl ratio was less than 1.03.[277] He subsequently testified, however, that the methylene to methyl ratio might be as high as 1.6.[278]

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[273] Zletz Record, *supra* note 16, at p. 4001.

[274] *Id.*

[275] This understands the term "polymethylene" to refer to polymer chain sequences of more than one methylene unit.

[276] Zletz Record, *supra* note 16, at p. 4001.

[277] Tr., p. 6339. Koenig actually testified that for every 1000 pendant methyl groups, EP-34 contained no more than one methylene sequence having four or more methylene units. This Court transposed Koenig's estimates by noting first that since methylene sequences are separated by dangling methyl groups, there must be an equal number of methylene sequences and methyl groups. The total number of methylenes is calculated by summing the number of methylenes in each sequence. The methylene to methyl ratio may thus be determined by dividing this sum by the total number of methylene sequences.

For the purpose of this analysis, this Court assumed that each methylene sequence reported by Koenig to contain at least four methylene groups contained precisely four and that the remaining sequences contained exactly one methylene unit. Both assumptions tended to produce results favorable to Standard. The methylene to methyl ration thus equals $\frac{(4X1) \div 999}{1000} = 1.03$.

[278] Tr., pp. 6441-50. Koenig actually testified that for every 100 pendant methyl groups EP-34 might contain as many as twenty methylene sequences containing four or more methylene units. This Court then transposed Koenig's estimates following the methods outlined in note 277, *supra*.

Appendix B

These conclusions that the methylene content of the products of EP-34 and EP-35 was insignificant were disputed by Phillips's Dr. David M. Wiles and Du Pont's Brame. Wiles examined S-91 and S-92 and found absorptions near 13.7 and 13.9 microns which indicated "significant" incursions of long methylene sequences inconsistent with a description of an essentially propylene structure.[279] Wiles concluded: "In view of the fact that there are significant amounts of long methylene sequences in the specimen giving rise to these spectra, [the product of EP-34] could not possibly have the properties of polypropylene. . . ."[280] He found the same peaks in S-76[281] and S-95,[282] and concluded that the product of Run EP-35 was a copolymer of ethylene and propylene.[283] Brame generally agreed with Wiles that significant concentrations of methylene chains were interspersed through the products of the two runs.[284] He testi-

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[279] Tr., pp. 7305-08.

[280] *Id.*, p. 7310.

[281] *Id.*, pp. 7311-15.

[282] *Id.*, p. 7320.

[283] *Id.*, p. 7321. Phillips attributes this high concentration of methylene to disproportionation. When propylene disproportionates it breaks up into molecules of butylene and ethylene; the ethylene then polymerizes with the remaining propylene, producing a copolymer which accounts for the methylene chains. According to Phillips's Dr. William Bailey, such disprportionation is likely when propylene is polymerized with the molybdenum catalysts employed by Standard. Bailey testified:

> "In related runs with similar catalyst practically all the data that I have seen with off-gases have indicated some evidence for disproportionation and, therefore, since I haven't seen data which would exclude disproportionation in these catalysts, I assume that this is a common reaction for these molybdenum catalysts. And therefore it would be very likely that this disproportionation reaction would have taken place in the four runs in question."

[284] Tr., pp. 7595, 7600, 7604.

fied that the methylene to methyl group ratio was between 2.06 and 2.10 in EP-34 and between 2.22 and 2.6 in EP-35.[285]

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[285] Brame explained the method that he used to calculate the mole percent of methyl to methylene sequences in Standard's products:

> "For those samples that were high in methylene content, I took the ratio of the methyl to methylene, the 8.6 micron band which is due to methyl and the 13.9 micron band which is attributable to long sequences of methylene, and obtained the absorbance values of each of those bands, and took the ratio of the absorbance values of those bands and, using the absorptivity or extinction coefficient supplied in the literature articles by either McMurray and Thornton [P-57; *See* Tr., p. 7614], or Bucci and Simonazzi [D-77; *See* Tr., p. 7614], I calculated the relative concentration of the methyl to methylene."

Tr., p. 7610-11.

In this way Brame calculated that for every 100 methyl groups in the product of EP-34 there were between fifty-three and fifty-five sequences of three or more methylene groups. *Id.*, p. 7616. This Court transposed Brame's estimates following procedures outlined in note 277, *supra*. Here, however, this Court assumed that each methylene sequence reported by Brame to contain at least three methylene groups contained exactly three methylene groups and that all other sequences contained exactly one group.

For EP-35, Brame calculated between twenty-five and forty-four sequences of three or four methylene groups, plus eighteen sequences of five or more methylene groups per 100 methyl groups. Tr., p. 7617. In this latter analysis, Brame concentrated on the 13.68 micron peak as an indicator for the three unit sequences and the 13.9 micron peak as an indicator for the five unit sequences, and compared both to the 8.6 micron peak. *Id.*, p. 7610. This Court transposed Brame's estimates by assuming that each methylene sequence reported by Brame to contain three or four methylene groups contained exactly three, that each methylene sequence reported by Brame to contain at least five methylene groups contained exactly five, and that all other sequences contained exactly one methylene group.

This Court notices that in comparing the 13.9 and 8.6 peaks, Brame inverted his ratio from the previous calculations ,and further, that he calculated the five group sequences ratio directly while

(footnote continued on following page)

Both Standard and Du Pont thus produced witnesses who testified that Carmody's products showed infrared absorptions in the 13.7 and 13.9 micron regions indicative of long sequences of methylene units. Since the presence of these sequences is inconsistent with a recurring propylene unit structure, the remaining question is their significance.

The second limitation of the Court does not require that the propylene units recur in a perfect manner, *i.e.*, wthout any random methylene interspersion, but only that the product consist *essentially* of recurring propylene units. Small amounts of impurities may be tolerated as long as their amount is insufficient to effect the basic character of the composition.[286] A Natta patent application indicates that propylene polymers with a methylene to methyl ratio of at least 1.105 are "only slightly altered".[287] On the

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(footnote continued from preceding page)

having determined the three group sequence ratio in EP-34 by first determining the number of methyl groups and then deriving the methylene ratio. *See* D-779. Since none of the parties questioned these possible inconsistencies, this Court assumes that they are immaterial.

Standard objected to Brame's calculations, arguing that Brame had failed to follow the accepted procedures and had devised instead his own technique. Standard's Priority Brief, *supra* note 228, at pp. 64-71. Brame's findings that the ratio was high, however, are consistent with those of Standard's Hopkins, who reported a ratio of 4.2 in EP-34, and 4.0 in EP-34. S.81.

[286] Interference Record, Paper No. 132, pp. 3-4.

[287] M-1176, p. 9. Natta never actually indicated the methylene to methyl ratio but only stated that propylene polymers were only slightly altered when they were prepared from a feed containing five percent ethylene. Since Natta observed that ethylene polymerizes more rapidly than propylene, this Court therefore assumed that Natta's polymers must have contained at least five percent ethylene. M-1261 shows that the methylene to methyl ratio in propylene polymers containing five percent ethylene is at least 1.105, if the percentage reflects a molar ratio, and 1.16 if the percentage reflects a weight ratio.

other hand, Brame testified without refutation that when the methylene to methyl ratio rises as high as 1.53, a polymer of propylene would change from the amorphous to crystalline states, clearly altering the basic character of the composition.[288]

Since Standard has failed to introduce any evidence that a product could have a methylene to methyl ratio at the high end of the range between 1.105 and 1.53 and still consist essentially of recurring propylene units, the Court finds that the maximum ratio consistent with the Count is closer to 1.105.

Brame testified that both of Carmody's products had ratios above 1.53. Standard's own witness, Koenig, ultimately testified that they exhibited ratios of 1.6. Koenig's remaining testimony and the testimony of Doty that the methylene content was insignificant were too conclusionary to be afforded much weight, since neither witness ever provided any basis for his conclusions that the peaks in the 13.7 and 13.9 micron regions were insignificant. In the absence of even a preponderance of evidence to the contrary, the Court affirms the Board's finding that Carmody's products did not consist essentially of recurring propylene units.

In attempting to show that the products of Runs P-1 and P-9 were propylene, consisting essentially of recurring propylene units, Standard relied principally upon depositions of Hopkins, Doty, and William E. Kaminsky, and upon the trial testimony of Koenig. Under Hopkins's supervision, the product of Run P-1 was twice subjected to infrared analysis, resulting in the preparation of scans S-77 dated June 18, 1953, and S-100 dated February 16, 1954.[289] Both spectra showed absorbtion in the regions ex-

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[288] Tr., p. 7715; M-1261.

[289] Tr., pp. 6188-94.

pected for homopolymers of propylene. On February 23, 1954 Hopkins reported that P-1 absorbed infrared radiation near 7.25, 8.6, and 11.85 microns and contained little if any chain methylene absorption based on observation of the lack of a strong doublet near 13.7 and 13.9 microns.[290]

Finally, Koenig compared Hopkins's scans of the product of P-1 with scans of crystalline polypropylene known to meet the Count which had been filed by Natta in U.S. Application No. 516,099, and found that the infrared spectra were "virtually the same".[291]

As for P-9, Kaminsky testified that on August 26, 1954, he subjected the product of that run to infrared analysis, producing Scan S-61.[292] Reviewing this scan, Doty testified that the major constituent of the P-9 material was "crystalline head-to-tail 1,2-polypropylene".[293] He found no evidence of substantial methylene chains that would disrupt an essentially propylene structure in the products of either P-1 or P-9.[294]

On the other hand, Brame thought that Peters's products were copolymers because he found methylene to methyl ratios of between 1.32 and 1.38 for P-1, and between 1.48 and 1.66 for P-9.[295] Phillips's Wiles did not testify regard-

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[290] S-44.

[291] Tr., p. 6381.

[292] Zletz Record, *supra* note 16, at pp. 2811-13.

[293] *Id.*, p. 4014.

[294] *Id.*

[295] Tr., pp. 7618-19. Brame actually testified that for every 100 pendant methyl groups, P-1 contained between four and ten sequences of three or four methylene groups and six sequences of five or more methylene groups. Brame also calculated that for every 100 pendant methyl groups, P-9 contained between twelve and twenty-one sequences of three or four methylene groups and six sequences of five or more methylene groups. D-779. These values were transposed following procedures noted in note 277, *supra*.

ing these products. The best argument against Peters's products was thus that their methylene to methyl ratios were in the middle of a range of possibly acceptable values. In addition, Doty and Koenig never acknowledged the existence of any peaks showing substantial methylene chains in these products, as they had for those of Carmody. The Court cannot say as a matter of fact that the methylene concentration reported by Brame would alter a propylene sufficiently so that it could not be said to consist essentially of recurring propylene units. Further, scan S-100 of P-1 is very similar to Natta's infrared scan of products found to fall within the Count. Considering this evidence, the Court finds that Peters's products were polypropylenes consisting essentially of recurring propylene units.

Standard's arguments that the products of Runs EP-34 and EP-35 had a *substantial crystalline polypropylene content* are based solely on analysis of infrared spectra since no x-ray diffraction scans were made. Doty testified that there are two standards for determining the degree of polypropylene crystallinity from infrared spectra; the Heinen scale which compares absorptions at 11.85 microns indicating the number of propylene units in the crystalline lattice and at 8.6 microns indicating the number of propylene units in the sample and the Luongo scale, which focuses on the 10.03 and 10.27 micron bands as the respective indicators.[296] Applying these two standards, Doty calculated that the product of Run EP-34 as between 27% and 38% crystalline, [297] and that the product of Run EP-35 was between 34% and 41% crystalline.[298] Since none of the parties disputes Doty's testimony, the Court accepts it as

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[296] Zletz Record, *supra* note 16, at pp. 4007-0.8

[297] *Id.*, p. 4009.

[298] *Id.*, p. 4010.

true and finds that products of Runs EP-34 and EP-35 had a substantial crystaline polypropylene content.[299]

Infrared scans of the products of P-1 and P-9 also exhibited the 10.03 and 11.85 micron peaks signifying that the products had a substantial content of crystalline polypropylene.[300] The crystallinity of these products is further established by examination of X-ray diffraction scans. On September 14, 1953 Standard's Kimball prepared two X-ray diffractions scans, S-45 and S-47, and a photograph, S-48, of the product of P-1,[301] and on November 16, 1953 he prepared another X-ray diffraction scan, S-50.[302] In his interference testimony, Kimball testified that at least scans S-45 and S-47 indicated that the products were crystalline.[303] This conclusion was buttressed by the interference testimony of Dr. Charles Ehrhardt.[304] In March, 1954, Kimball again subjected the product to X-ray analysis, preparing films S-52, S-54, S-55 and S-56, which also led Kimball to conclude that the product was crystalline.[305] Dr. Robert H. Marchessault testified that the photograph, S-48, indicated that P-1 produced a crystalline polymer

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[299] This finding in no way implies that the products of EP-34 and EP-35 consisted of essentially recurring propylene units. Apparenty, propylene samples will absorb infrared radiation in the 10.03 and 11.85 micron regions when the polymer contains some segments of as few as ten propylene units arranged in a recurring fashion. Tr., p. 7423. Absorbtion in this region therefore does not eliminate the possibility that long methylene sequences might interrupt these segments.

[300] S-44.

[301] Tr., pp. 6580-607.

[302] *Id.*, pp. 6633-34.

[303] *Id.*, pp. 6597-601.

[304] *Id.*, p. 6797.

[305] *Id.*, pp. 6640-58.

that was not polyethylene.[306] He also testified that S-50 indicated that the degree of crystallinity was 50% to 55%.[307] Standard's case was further buttressed by Mark, who described S-48 as indicating a product that is "distincly crystalline".[308] Subsequently, on December 11, 1953 Mark recorded in his notebook: "solid pp sample of Peters X-ray diagram shows crystallinity."[309]

As for the product of P-9, Kimbal subjected it to x-ray analysis on September 21 and 22, 1953 and prepared the scans comprising S-49. Marchessault testified that these scans "capture[d] all the diffraction peaks which were seen previously. . . . The material is distinctly crystalline."[310] In view of this uncontested testimony, the Court finds that the products of P-1 and P-9 exhibited substantial propylene crystallinity.

2. Recogntion of The Product

The Court found that all the presently available information regarding Carmody's products failed to justify the conclusion that they *consisted essentially of recurrng propylene units.* Since Standard's inventors could have known no more in the early 1950s than the Court knows today, the Court must conclude that Standard's inventors did not know enough about the products of EP-34 and EP-35 in 1950 to justify the conclusion that they corresponded to the limitations of the Count. Accordingly, this Court finds no recognition of Carmody's products.

The Court also finds that Standard's scientists failed to

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[306] Tr., p. 6858.

[307] *Id.*, pp. 6859-96.

[308] Standard's Prority Brief, *supra* note 102, at p. 30.

[309] S-293, p. 9.

[310] Tr., pp. 6870-71.

recognize the product of Run P-9. Mere preparation of an infrared or x-ray scan is not sufficient to establish recognition. An inventor must also appreciate the importance of the relevant peaks in the scan. Standard submitted no evidence regarding contemporaneous interpretations of the infrared scan S-61. As for the x-ray scans, the only evidence adduced concerning contemporaneous interpretations is Kimball's testimony that S-40, a general report of "dA values found for polypropylene", was prepared with reference to x-ray scan S-49,[311] a scan of the product of P-9. This report fails however to indicate that it was actually based upon S-49 rather than on x-ray scans of the product of P-1. Further Kimball's testimony tends to cast doubt on the fact of contemporaneous interpretation of the scan:

> Q. Do you recall at the time you obtained this scan —or I should qualify it—the two scans, which are illustrated on S-49, reaching a decision as to whether or not the sample exhibited crystallinity?
>
> A. It is apparent from the peaks that it does exhibit crystallinity. It would have been apparent at the time.[312]

The Court interprets Kimball's testimony as only claiming that if he had focused upon particular portions of S-49, he could have concluded that the product of P-9 was crystalline. Kimball did not testify that he actually focused on the relevant peaks. For these reasons, the Court finds that Standard's scientists had insufficient knowledge about the product of Run P-9 to justify the conclusion that it corresponded to the substance of the Count.

On the other hand, the Court finds that Standard has adequately established that the product of P-1 was recog-

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[311] Tr., pp. 6634-35.

[312] *Id.*, pp. 6693-94.

nized between June 1, 1953, when Peters removed the product of P-1 from his reactor, and May 17, 1954,[313] Du Pont's earliest claimed priority date. Standard's scientists clearly recognized that Peters had produced a new form of matter. Prior to the production of P-1, Hopkins conducted infrared scans on samples of polyethylene as well as on Carmody's products and observed methylene absorption peaks at about 13.7 and 13.9 microns. In sharp contrast he reported that the product of P-1 contained "little, if any . . . methylene absorption".[314] While Hopkins had prevously reported higher methylene to methyl ratios for other products, he estmated that the ratio for the product of P-1 was much lower.[315] Further, Kimball recognized that the X-ray scan S-45 of P-1 "was different from anything I had ever seen before. It was a unique diffraction pattern to me. . . ."[316] The accuracy of Kimball's assertion is supported by a laboratory notebook page dated November 16, 1953 indicating that while a number of previous polymers had a polyethylene structure, the product of Run P-1 had a polypropylene structure.[317]

In addition to recognizing that Peters had prepared a new material, Standard's scientists also recognized enough about the product of Run P-1 to justify the conclusion that it complied with the limitations of the Count. The best support for this is the fact that most of the evidence upon which this Court relied in finding that Standard's product

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[313] It is unnecessary to establish this date any more precisely since Standard's priority position among the parties will not be advanced by the choice of one priority date in this period over any other such dates.

[314] S-42.

[315] *Id.*

[317] S-51, p. 5.

[316] Zletz Record, *supra* note 16, at p. 1768.

complied with the limitations of the Count was prepared by Standard prior to May, 1954. After preparing the product of P-1, Peters observed that it was a *solid.*[318] By late February, 1953, Hopkins had reported both the presence of all the infrared peaks that are associated with the *polypropylene, consisting essentially of recurring propylene units* and the virtual absence of those peaks that are associated with the sequences of more than one methylene unit.[319] Hopkins also noted the presence of the infrared peaks that are associated with *crystallinity.* Finally, by early 1954 Kmball's work had proceeded to the point where he not only knew that Peter's products was crystalline, but he had begun to speculate about the particular crystalline arrangement.[320] The Court therefore finds that Standard's scientists recognized the product of P-1.

3. *Recognition of A Utility for The Product.*

In attemptng to prove recognition of a patentable utility for its products, Standard cites a laboratory notebook entry by Zletz:

> Whether the product is a solid, grease or oil it should be very useful. Solids of high specific viscosity should find use as a plastic. Solids of low sp. viscosity should find use as adhesives. Very low specific viscosity solids and greases may be good V.I. improvers while oils should be of interest as lubricants.[321]

Standard also relies upon a patent application submitted by Carmody and Zletz in 1951 regarding polymers such as the products of EP-34 and EP-35:

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[318] *See* text accompanying notes 266-268, *supra.*

[319] S-81.

[320] S-57. *See also* S-51, pp. 17-18; S-41, p. 2.

[321] S-1, p. 133.

> [T]hese solid polymers . . . can be subjected to such after treatment as may be desired, to fit them for particular uses or to impart desired properties. Thus, the solid polymers can be extruded, mechanically milled, filmed or cast, or converted to sponges or lattices. Anti-oxidents, fillers, extenders, plasticizers, pigments etc., can be incorporated in the solid polymerization products.[322]

More importantly, Standard relies upon the testimony of Peters and Mark. In early June, 1953 Peters testified that one of his products ". . . looks and feels like a good polyethylene except it is more flexible".[323] Peters also determined the products' viscosity and density. Peters subsequently formed a portion of one of his products into a self-supporting film in preparation for infrared analysis. In addition, a sample of Peters's first product was stretched in order to orient the crystals so that the dimensions of their unit cells might be determined.[324] Based on this information, Peters testified at trial: "I would expect it to have any applications that polyethylene would have applied to."[325]

Mark reported that he learned on or about January 26,

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[322] S-10, p. 26.

[323] S-43, p. 2.

[324] Standard also claims (Standard's Priority Brief, *supra* note 102, at p. 36) that Dr. Hopkins stretched a small sample "between two pairs of pliers to two or three times its original length." (Tr., pp. 6218-19). On cross-examintion, however, Dr. Hopkins testified that he could not recall how much the sample stretched and that he never attempted to measure the amount of stretching. Hopkins also admitted that the sample with which he worked may have been as small as one-quarter of an inch even after stretching. (M-1109, pp. 3587-90).

[325] Tr., p. 4675.

1954[326] that Peters had been unable to separate his product from the catalyst because it would not dissolve in benzene, and instead had dissolved it in xylene, heated to its approximately 284°F. (140°C.) boiling point.[327] This information indicated that Peters's products were generally resistent to solvents and that their melting points were very high, "certainly above 100 degrees".[328] Mark concluded that all "these various attributes add(ed) up to a material which would have a wide variety of useful application."[329]

The Court's analysis of this information confirms that Standard's scientists did not learn enough about any of their products to justify the conclusion of a specific utility. Zletz's description is too broad, spanning a range of possible results without identifying where his particular product would fit. Carmody's description is relevant to methods of making the product useful, rather than to particular uses. Peters and Mark rely on tests relevant to identification of the product and speak in terms too general to indicate a specific utility. Although Standard's scientists might have ascertained that their polymers had a high molecular weight, they did not engage in the specific use testing suggested by Phillips's Fox and adopted by this Court as the minimum necesary to justify a conclusion that a material is useful as a solid plastic.[330] Standard failed to introduce any evidence that its scientists tested to determine the Young's modulus for any of its

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[326] *Id.*, p. 7062.

[327] *Id.*, pp. 7066-68.

[328] *Id.*, p. 7068.

[329] *Id.*, p. 7069.

[330] *See* text accompanying note 87, *supra*.

materials. Although the Peters's experiments may indicate that polymers would not melt below 100 degrees, no one ever deetermined that the products would not decompose at the higher temperatures required for molding. In the absence of the testing required to prove utility as a solid plastic or of a claim for a specific alternate use, the Court affirms the Board's finding regarding utility.

4. *Standard's Possible Relation Back Argument.*

Although Standard's Brief is unclear, it is possible that Standard argues that it is entitled to a date of priority during the summer of 1950 based upon the combination of Zletz's alleged conception and Peters's claimed reduction to practice.[331] Such relation back is provided by 35 U.S.C. § 102(g) which states in relevant part:

> In determining priority of invention there shall be considered not only the respective dates of conception and reduction to practice of the invention, but also the reasonable diligence of one who was first to conceive and last to reduce to practice, from a time prior to conception by the other.

This provision is not available to Standard because there is no reduction to practice that could relate back to Zletz's alleged conception. There is also a lack of conception on the part of Zletz, and a further lack of required diligence on the part of Standard's scientists.

In the patent field, "conception" is defined as the "mental formulation and disclosure by the inventor of a complete idea for a product or process".[332] It is a "definite and

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[331] Standard's Priority Brief, *supra* note 102, at p. 7-35.

[332] Chisum, *supra* note 58, at § 10.04.

permanent idea of the complete and operative invention as it is thereafter to be applied in practice".[333]

It is often difficult in experimental sciences such as polymer chemistry to form a complete conception prior to significant experimentation. This situation was noted by Robinson:

> The production of a new means by [experiment] is . . . an inventive act, but at no instant before the experiment success can it be said that the conception of the invention exists in the inventor's mind. Until that instant it is mere speculation, at most a probable deduction from facts already known and the same act which reduces it to practice gives to the conception its definite and final form. Hence the date of the conception in such cases is the date, not when experiments begin, but when they end; and the first to bring the art or instrument into successful operation is the first conceiver of the entire invention.[334]

This observation does not mean that in no chemical patent case may a conception exist independently of the production of the product. Rather the question is one of fact as to the completeness of the conception.[335] In the instant case, the facts indicate that Zletz's conception was in fact incomplete. Although Zletz had the idea of polymerizing propylene with a molybdenum catalyst, he did not have a sufficiently specific idea of the complete and operative product ultimately produced by Peters, as evidenced by an entry in his notebook for September 26, 1950 where

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[333] Mergenthaler v. Scudder, 11 App.D.C 264, 731 (D.C. Cir. 1897).

[334] 1 Robinson, The Law of Patents For Useful Inventions, § 381 (1890).

[335] *See* Chisum, *supra*, note 58, at § 10.04[5].

Zletz recorded that the product could be either "a solid, grease or oil."[336]

Further, Standard admits that Peters was assigned to report on the experiments employing Zletz's catalyst only after "a large number of experiments had been done by Evering's group on the polymerization of olefins . . . using the Zletz catalysts under varying reaction conditions".[337] These experiments were in fact so extensive that it took Peters nearly a year to organize and submit his report.[338] This subsequent experimentation and the corresponding changes made in Zletz's procedure indicate that the conception was not sufficiently complete to support the idea that Peters's work was merely the reduction to practice of Zletz's conception. The applicable rule was stated by the C.C.P.A. in *Alpert v. Slatin:*[339]

> Conception of an inventive process involves proof of mental possession of the steps of an operative process and, if necessary, of means to carry it out to such a degree that nothing remains but routine skill for effectuation thereof. If after the claimed conception date extensive research was found necessary before achieving minimum satisfactory performance obviously the mental embodiment of that date was a mere hope or expectation, a statement of a problem, but not an inventive conception.[340]

Even if Zletz's conception was sufficiently complete to

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[336] S-1, p. 133.

[337] Stnadard's Priority Brief, *supra* note 102, at p. 20.

[338] Proposed Findings of Fact and Conclusions of Law of Plaintiff Standard Oil Company (Indiana) With Respect to Priority, I., 4-04.

[339] 305 F.2d 891 (C.C.P.A. 1962).

[340] *Id.*, p. 894.

allow a person of reasonable skill in the polymer field to produce the product of the conception, Standard did not prove that it had been diligent for purposes of 35 U.S.C. § 102(g) during the critical period from a date just prior to the earliest reduction to practice by an opposing party until its own reduction to practice. It is true that

> the diligence required is not extraordinary. It needs to be only reasonable under the circumstances of the case, nor does it involve "uninterrupted effort nor the concentration' 'of all the applicant's energies upon the simple enterprise. "The health, the means, the liberty of the inventor . . . are proper subjects for consideration" in determining the question.[341]

Zletz's alleged conception, Standard argues, occurred during the summer of 1950.[342] Following Zletz, Standard initiated programs to study the polymerization of ethylene,[343] with Carmody conducting experiments on the polymerization of propylene from September through October, 1950.[344] In July, 1952 Peters was then assigned to compile a report of the polymerization data that had been collected using the Zletz catalysts, which he submitted in April, 1953.[345] Peters then began his own propylene polymerization experiments.[346]

The Court does not find that this history presents a convincing argument that Zletz's conception of the po-

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[341] Dickinson v. Swinehart, 263 F. 474, 475 (D.C. Cir. 1920).

[342] Proposed Findings of Fact and Conclusions of Law of Plaintiff Standard Oil Company (Indiana) With Respect to Priority, I., 1.02-1.05.

[343] *Id.*, I. 4.02.

[344] *Id.*, I., 3.04, 3.09.

[345] *Id.*, I. 4.04.

[346] *Id.*, I., 4.06.

lymerization of propylene was diligently pursued from just before the date of Phillips's first actual reduction to practice on or about October 9, 1951,[347] until June 1, 1953, the earliest possible date for Peters's reduction to practice. The only specific instance of propylene polymerization experiments identified by Standard are those of Carmody in the fall of 1950 and arguably Peters's commencement of data compilation in July, 1952. This leaves an unexplained gap of approximately eighteen months during which Standard claims to have been doing no more than studying the polymerization of ethylene a substance distinct from the product of Zletz's alleged conception. The Court finds, therefore, that Standard has failed to adduce evidence of due diligence in the reduction of Zletz's alleged conception regarding polymerization of propylene.

Standard's Constructive Reduction To Practice.

Montedison contends that the Board improperly granted Standard's constructive reduction to practice claim since Standard's 1954 application failed to disclose the second and third limitations of the Count as required by 35 U.S.C. § 112. Specifically, Montedison contends that the application is defective because it disclosed products that were not polypropylene consisting essentially of recurring propylene units. Montedison also argues that the application failed to establish sufficiently that the product has a substantial crystalline component.[348] The Board's Opinion addressed these objections and found them insufficient to require denial of Standard's claim.[349] The Court finds that the Board was correct in this determination.

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[347] See text accompanying notes 363-364, *infra*.

[348] Montedison's Reply Brief, *supra* note 65, at pp. 83-84.

[349] Board's Opinion, *supra* note 18, at pp. 65-66.

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If an application describes a broad range of ingredients which taken in variuos combinations would lead to the claimed product, and the applicant seeks a patent for one preferred combination, rejection is proper if such preference is not explicitly stated.[350] The C.C.P.A. has, however, decided against development of a universal rule barring the use of a generic disclosure as support for a specific claim. In *In re Wertheim,* the Court stated:

> That what [applicants] claim as patentable to them is *less* than what they describe as their invention is not conclusive if their specification also reasonably describes that which they do not claim. . . . As we said in a different context in *In re Saunders,* 441 F.2d 599, 607, 'To rule otherwise would let form triumph over substance, substantially eliminating the right of an applicant to retreat to an otherwise patentable species merely because he erroneously thought he was first with the genus when he field.' (emphasis in original).[351]

The question of the propert test for determining when a generic application should be allowed for a specific invention was addressed by the C.C.P.A. in 1956:

> [W]hether an application forms a proper support for a claim to a composition which is not specifically dis-

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[350] This was the context in In re Ruschig, 379 F.2d 990, where at 995 the C.C.P.A. stated:

> "Not having been specifically named or mentioned in any manner, one is left to selection from the myriads of possibilities encompassed by the broad disclosure, with no guide indicating or directing that this particular selection should be made rather than any of the many others which could also be made."

[351] 541 F.2d 257, 263 (C.C.P.A. 1976).

> closed, but which falls among composition suggested by general language in the application . . . must be determined largely by the particular circumstances of each case. . . . [T]he indication or lack of indication of a preference for the composition, in the application disclosure, is an important factor to be considered in making the determination, since anyone attempting to carry out the disclosure of an application would logically begin with the preferred examples given.[352]

This Court has determined that Standard's generic description properly discloses a specific invention. The problem in the instant case is not one of a multiplicity of procedures but a multiplicity of products. Standard's application clearly discloses a product meeting the limitations of the Count. In the application, Zletz describes his invention as relating to the production of solid polymers from propylene:

> One object of my invention is to prepare polymers from propylene which are solids at normal room temperature and, at said temperatures, do not exhibit the flow and deformation characteristics of viscous liquids. Another object is to prepare rubbery, elastic solid polymers from propylene. Yet another object of my invention is to provide novel polymers from propylene which can be used to prepare self-sustaining films.[353]

The application discloses a "normally solid polypropylene"[354] with density between .85 and .95, a softening point above 120°C., and a viscosity in excess of .1.[355] the appli-

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[352] Prutton v. Fuller, 230 F.2d 459, 463 (C.C.P.A. 1956). *See also* Spero v. Ringold, 377 F.2d 652 (C.C.P.A. 1967).

[353] M-1137, p. 2.

[354] *Id.*, p. 11.

[355] *Id.*, p. 3.

cation also discloses infrared spectra for the product with peaks at 7.25, 8.6, 10.03, 10.27, and 11.85 microns and the absence of peaks 13.7 and 13.9 microns.[356] The application further discloses a methylene to methyl ratio of "Sa.1" for the product.[357]

Montedison objects because the application also disclosed products with methylene to methyl ratios that do not indicate the product of the Count. The fact that the application discloses other inventions in addition to that of the Count does not, however, mean that one following its teaching would necessarily be "left to selection from myriad possibilities . . . with no guide indicating that this particplar selecton should be made".[358] Zletz's preference for the product of P-1 is clearly indicated in the language of the application. An experimenter turning to the application for guidance in producing the "normally solid polypropylene" described in the original application would easily discern the desired product from among the copolymers of ethylene and propylene and the homopolymers of ethylene that were also possibly produced by the process. He would be able to discard the copolymers and the polymers of other substances and to select the product of the Count. The problems inherent in some broad disclosures are therefore not apparent here, and there is no reason to apply a restrictive rule to Zletz's application. The Court therefore finds that the Board was not in error in applying the rule of law that allowed Standard's disclosures to constitute a constructive reduction to practice.

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[356] *Id.*, p. 11.

[357] *Id.*, p. 6.

[358] *See* note 350, *supra*.

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Montedison also claims that the data included in Standard's application are not sufficient to establish that the product disclosed has a crystalline content because "crystallinity" was not mentioned in so many words. The description requirement, however, does not mandate *in haec verba* repetition of the formal language of the Count. All that is necessary is that the application describe the product in language that is legally equivalent to that of the Count. Standard's application disclosed that the product of P-1 absorbed infrared radiation at 10.03 and 11.85 microns,[359] indicating that this polymer was crystalline. Standard's application also disclosed that x-ray diffraction data for the product of P-1 indicated that the polymer has an "orthorhombic crystal form" and that its cell dimensions are "unquestionably different from the crystallographic structures of solid polyethylenes or solid polyisobutylenes".[360] Standard's application thus disclosed that its product was crystalline.

Montedison also attacks Standard's application for failing to disclose "substantial" crystallinity. The word substantial, however, requires only that the crystalline content not be inconsequential.[361] Thee Board held that "the Zletz application sets forth the crystallographic constants for the product of run P-1, which, based on x-ray data, gives an explicit disclosure of crystal form and dimension of the unit cell of the crystal."[362] The inclusion of such complete data shows that Standard claimed a product constaning more than an inconsequential amount of crystalline polypropylene. The Board's finding is therefore affirmed.

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[359] M-1137, p. 11.

[360] M-1137, p. 12.

[361] *See* text accompanying note 43, *supra.*

[362] Board's Opinion, *supra* note 18, at p. 69.

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Phillips's Priority Case

Phillips claims a priority date no later than January 27, 1953 based upon actual reductions to practice on October 9 and November 19, 1951, and February 12-27 and April 16, 1952, and upon a constructive reduction to practice on January 27, 1953, grounded on United States Application No. 333,576. The Board denied Phillips's actual reduction to practice claims, finding that Phillips failed to establish that any of its runs produced a product consisting essentially of recurring propylene units having a substantial crystalline content or having a specific practical utility.[363] The 1953 application was also rejected for failing to disclose the product of the Count and for failing to disclose a utility for the product.[364] The Court finds that Phillips did indeed reduce to practice the product of the Count in each of its claimed actual reductions to practice, that it recognized these products and their utility as wax modifiers, and that the 1953 application constituted an adequate constructive reduction to practice. The Court accordingly awards Phillips a priority date of at least as early as January 27, 1953.

Phillips's Actual Reduction To Practice.

Phillips's development of crystalline polypropylene began in June, 1951 in the Catalytic Process Section of its Hydrocarbon Conversion Branch, located in Bartlesville, Oklahoma.[365] At that time, Dr. W. C. Lanning managed the Catalytic Process Section,[366] John Paul Hogan worked as a group leader,[367] and Robert L. Banks, Dr. Gene Nowlin,

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[363] Board's Opinion, *supra* note 18, at pp. 57-64.

[364] *Id.*, at pp. 39-44.

[365] Tr., p. 18.

[366] Hogan Record, *supra* note 16, at p. 11.

[367] *Id.*

and Edward Francis[368] worked as research chemists. Some research activities were also done in the Lube Oil Section, managed by Dr. Nelson Axe,[369] who was assisted by A. N. Devault and J. T. Gragson.[370]

Prior to June, 1951 Hogan's group had been working on the conversion of olefins to polymers.[371] Under Hogan's supervision, Banks attempted to develop a commercial process for such conversion utilizing a catalyst containing nickel oxide on a silica-alumina support.[372] On June 5, 1951 Banks modified the catalyst slightly and prepared a new catalyst that contained chromium oxide and nickel oxide supported on silica alumina.[373] A subsequent run with propylene produced a solid product.[374]

Hogan and Banks subsequently switched their attention to a catalyst containing only chromium oxide on a silica alumina support. On October 9, 1951 Francis conducted Run 4721-16 and produced the first product upon which Phillips now relies. In this Run Francis used a fixed bed reactor containing 57.5 g. of catalyst. The catalyst was prepared by mounting chromium nitrate on a commercially produced silica alumina pellatized (14-28 mesh) support. During the five and one-half hour reaction, Francis maintained a temperature of 190°F. (88°C.) and a pressure of 600 psig. As a diluent, Francis used isopentane. Francis obtained between forty and fifty grams of polymer,[375] which

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[368] *Id.*

[369] *Id.*, p. 637.

[370] *Id.*, p. 940.

[371] *Id.*, p. 12

[372] *Id.*, p. 215.

[373] *Id.*, pp. 12-13.

[374] *Id.*, p. 12.

[375] P-12, p. 40.

Nowlin later fractionated, recovering a "polypropylene gel" that was insoluble in chloroform and benzene.[376]

Hogan, Banks, and Francis again polymerized propylene on November 19, 1951 in Run 4721-26.[377] Phillips's scientists used a fixed bed reactor in this experiment.[378] Their catalyst contained four weight percent chromia on a commercially produced silica alumina pellatized (8-14 mesh) support. It was activated by heating to 730°F. (388°C.).[379] Isopentane was used as a diluent. During the thirty-eight hour reaction, a temperature of about 180°F. (82°C.) and a pressure of betwene 480 and 500 psig were maintained, and 70.5 g. of "tacky polymer" were recovered. DeVault later separated out a product that was insoluble in both methyl isobutyl ketone and n-pentane.[380]

Hogan and Banks again polymerized propylene in three experiments during February, 1952, numbered 4958-13, -15, and -18, using the same appartus as in Run 4721-26. The catalyst contained three weight percent chromia on one-eighth inch pellets of a commercially available silica alumina support. As diluents, Hogan and Banks used isooctane and pentane. During each of the above runs, a reaction temperature of between 200°F. (93°C.) and 230°F. (100°C.) and a pressure of about 400 psig were maintained for fifteen hours. These runs produced a total of nearly eight pounds of crude polymer.[381] DeVault and Gragson later fractionated the combined products of these three runs, obtaining Sample PO-133 which was insoluble in pen-

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[376] P-39.

[377] P-12, pp. 53-55.

[378] *Id.*, p. 47.

[379] *Id.*, p. 53.

[380] P-45, pp. 33-36, 46-47.

[381] P-13, pp. 19, 26, 33.

tane and a mixture of methyl isobutyl ketone and toluene at 200°F. (93°C.).[382]

Hogan and Banks polymerized propylene a fourth time on April 16, 1952, preparing more than two pounds of a solid propylene polymer. In this experiment, numbered 4958-44, they used the same reactor as was used in preparing PO-133. The catayIst, the precise nature of which is unclear, was activated by heating to 925°F. (496°C.). During the twenty hour experiment, Hogan and Banks maintained a reaction temperature of 190°F. (88°C.) and a pressure of about 460 psig. As diluents, they used isooctane and propane.[383] The crude product was fractionated under Hogan's supervision. The result was PO-116, which was insoluble in boiling methyl isobutyl ketone.[384]

1. Production of The Product of The Count.

Each of Phillips's four products were *normally solid.* Phillips's infrared expert Vernon Thornton observed that the product of Run 4721-26 was a "hard, crystalline translucent solid".[385] DeVault recorded that the product of Run 4721-26 was:

> a fluffy white powder and upon heating it on a hot plate, it became clear and upon cooling it became opaque and had the appearance of polyethylene samples.
>
> . . . .
>
> [B]y adding some of this powder into the aluminum [weighing pans] on the hot plate, [the material] would melt and then you could peel, when it solidified, cooled,

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[382] P-45, pp. 98-100; P-46, p. 1.

[383] P-13, pp. 72-75.

[384] P-14, p. 90-91.

[385] Hogan Record, *supra* note 16, at p. 1747.

> you could pe[illegible]ne aluminum from the sample. . . . The material was solid. . . . And it would hold the shape of the vessel in which it was melted, and solidified.[386]

DeVault also recorded that PO-133 was "hard",[387] and that it was initially a white powder:[388]

> [Following the] procedure I mentioned previously of heating a small amount in an aluminum container on a hot plate, removing it from the hot plate, cooling it and peeling off the aluminum from the sample, [I obtained] . . . . a plastic material that maintained the shape of the container that it had been melted in.[389]

Finally, PO-116'6 solidity was reported in P-14[390] and was evidenced by its being pressed into films suitable for infrared analysis.[391] Since the parties do not argue otherwise, the Court concludes that Phillips's products were indeed normally solid.

All of Phillips's products were *polypropylenes, consisting essentially of recurring propylene units.* On November 26, 1951 the product of Run 4721-16 was subjected to infrared analysis and scan P-20 was prepared. This scan showed the familiar absorption pattern for a polypropylene, consisting essentially of recurring propylene units.[392]

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[386] Hogan Record, *supra* note 16, at pp. 1030-31. *See also* P-45, p. 36.

[387] P-46, p. 1.

[388] Hogan Record, *supra* note 16, at p. 1049.

[389] *Id.*, p. 1051.

[390] P-14, p. 90.

[391] Hogan Record, *supra* note 16, at pp. 1271-72.

[392] Tr., pp. 4219-31.

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In July, 1952 Thornton, who then headed the infrared spectroscopy group at Phillips,[393] thus reported that P-20 showed:

Microns		
13.86 - 12.74	no major bands	$R-(CH_2)_n-CH_3$; n=0 indicated
10.88 - 10.85	no major bands	C-C-C-R and C-C-C-C-R absent (C R)
10.80 - 10.73	no major bands	C-C(C)-R absent
10.73 - 10.71	no major bands	R-C(C)-C-R absent
10.30	absorption band	isolated (CH_2); (R-C(R)-C(R)-R) indicated
8.96	no major band	no adjacent tertiary carbons
8.63	absorption band	R-C(C)-C-R indicated
8.56	uncertain	C(C)-C-R absent
8.10 - 7.98	no absorption bands	
7.31	no absorption band	C-C(C)-R Absent, CH_3 indicated
7.25	absorption band	
7.17 - 7.16	no major band	C-C(C)-C-R absent

These observations are consistent with the proposed carbon structure:

[394]

$$\left(C - C(C) \right)_n$$

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[393] *Id.*, p. 4211.

[394] P-56, p. 7. A polymer chemist would understand that "the proposed [carbon] structure (C-C) " would indicate the
(|)
(C)n
essentially recurring propylene unit structure depicted in Figure 2, accompanying note 35, *supra*. Hogan Record, *supra* note 16, at p. 1589.

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The products of Run 4721-26 was again subjected to infrared analysis on December 22, 1955, producing scan P-117, and on October 19, 1958, producing scan P-118.[395] The peaks in these scans confirm that the product of Run 4721-16 was polypropylene, consisting essentially of recurring propylene units.[396]

Infrared analysis also established that the product of Run 4721-26 was a polypropylene, consisting essentially of recurring propylene units. This product was subjected to infrared analysis on or about December 12, 1951[397] and spectrum P-24 was produced. Along with P-20, P-24 formed part of the basis of Thornton's 1952 report establishing that Phillips's products met the second limitation of the Count.[398] P-24 shows the characteristic absorptions for polypropylenes consisting essentially of recurring propylene units.[399] Hogan thus concluded: "[P-24] appeared to be the spectrum of a sample, the major component of which was crystalline polypropylene of the same structure as the polypropylene gel. . . ."[400]

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[395] Hogan Record, *supra* note 16, at pp. 3402-04; Tr. pp. 2722-23.

[396] Tr., p. 2623. The witness, Dr. David Wiles did not actually use this precise language; rather he only said that the sample was "polypropylene". His previous testimony, however, indicates that he considered that the word polypropylene subsumed the phrase "polypropylene, consisting essentially of recurring propylene units". Looking at a picture of recurring propylene units, P-1059, Wiles thus testified:

> "This is the chemist's way of designating what the repeat units are in a molecule made from propylene; that is to say, polypropylene."

Tr., p. 2673.

[397] Hogan Record, *supra* note 16, at pp. 352, 356.

[398] *Id.*, p. 1594.

[399] Tr., pp. 2699-2701.

[400] Hogan Record, *supra* note 16, at pp. 1611-12.

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PO-133 was never subjected to infrared analysis. It was produced, however, by following a process which was very similar to that used in making the products of Runs 4721-16 and 4721-26 as well as PO-116. Since infrared scans of those three products clearly indicate that they were polypropylenes, consisting essentially of recurring propylene units, this was probably true of PO-133. Phillips also showed that in December, 1952, Phillips's scientists M. L. Gallaugher measured PO-133's physical characteristics and found that it had a density of 0.914 g./cm.^{3} and a melting point of 236±5°F. (113±3°C.).[401] Both of these values are within the ranges normally associated with product of the Count.[402] Combined with the information that PO-133 was a solid[403] made from propylene[404] and insoluble in pentane,[405] yet its viscosity was measured on May 20, 1953 and found to be 0.508,[406] the density and melting point values may, in fact, uniquely describe solid crystalline polypropylene. At any rate, the other parties were unable to point to a single product having these properties that was not the product of the Count.

PO-116 was subjected to infrared analysis on November 25 and 26, 1952 and scans P-48 and P-49 were produced.[407] Both scans indicate that PO-116's product was a polypropylene, consisting essentially of recurring propylene units. A. P. Frenzel, who worked with Thornton at Phillips, observed between December 1952 and about January 25, 1953

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[401] P-59, p. 33; Hogan Record, *supra* note 16, at pp. 2059-68.

[402] *See* text accompanying note 46, *supra*.

[403] *See* text accompanying notes 387-389, *supra*.

[404] *See* text accompanying note 381, *supra*.

[405] *See* text accompanying note 382, *supra*.

[406] P-196; Natta Record, *supra* note 16, at pp. 1085-92.

[407] Hogan Record, *supra* note 16, at p. 1274; Tr. pp. 2701-02.

that PO-116 absorbed infrared radiation at the wavelengths characteristic of polypropylenes, consisting essentially of recurring propylene units:[408]

> [T]here were absorption bands occurring at 6.8 microns, which are characteristic of hydrocarbon systems, methyls and methylenes absorbed there. A very intense band at 7.25 microns, characteristic of methyl groups. An absorption band at [8.6] microns, a very sharp band at [8.6], characteristic of isolated methyl branches. Absorption band at [10.03], which we don't know the exact origin. Absorption band at [10.27] microns, which we think belongs to isolated methylenes. . . . and there is distinct absence of band at [13.7 and 13.9], indicating that this material is not polyethylene.

All of Phillips's products had a *substantial crystalline polypropylene content.* Wiles concluded from scan P-20 that the product of Run 4721-16 exhibited substantial crystallinity:

> Moreover, I now draw your attention to the area around [ten microns]. There is a peak just [over 10.00 microns]. There is a peak about [10.27]. Those peaks are nearly the same size. The [10.03] peak, as I have been calling it, is very nearly as large as the [10.27] peak. Therefore this sample of polypropylene exhibits substantial crystallinity.[409]

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[408] Hogan Record, *supra* note 16, at pp. 1370 and 1375.

[409] Tr., p. 2698. Insertion of the parenthetical information was necessitated by Wiles's use of "wavenumbers" (units: 1/cm.) rather than wavelength in microns. Equivalent wavelengths were calculated as the reciprocal of the wavenumber and converted to micon units (10.00 microns = 1cm.).

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Wiles also recognized similar features indicating substantial crystallinity in P-117[410] and P-118[411] of this product. On December 12, 1955 the product of Run 4721-16 was subjected to x-ray analysis.[412] Phillips's Dr. Robert Gregg analyzed the resulting scan, P-138, and concluded that the polypropylene gel was "partially crystalline polypropylene",[413] explaining: "I was told it was polypropylene first. Secondly, it agreed with the publication that was available to me from Professor Natta's laboratory."[414] As early as 1958, in fact, Gregg had analyzed scan P-138 and had concluded that the product of Run 4721-16 was 61% crystalline.[415]

Phillips adduced similar testimony regarding the product of Run 4721-26. Wiles testified that scan P-24 showed that that product was substantially crystalline,[416] and Gregg prepared x-ray scan P-139 on July 24, 1959 on which he noted that the product was 35% crystalline.[417]

PO-133 was never subjected to infrared or x-ray analysis. Phillips did adduce other data regarding PO-133's melting point, inherent viscosity, and solubility, all of which corresponded to values normally associated with crystalline polypropylene.[418] The manner in which the melting point data was generated also indicated that PO-133 was crystalline. In measuring the melting point, Gallaugher heated

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[410] Tr., pp. 2722-23.

[411] *Id.*, p. 2723.

[412] *Id.*, pp. 2915-17.

[413] *Id.*, p. 2915.

[414] *Id.*, p. 2992.

[415] Hogan Record, *supra* note 16, at p. 3852.

[416] Tr., p. 2700.

[417] *Id.*, p. 2918.

[418] *See* text accompanying notes 401, 406-407, *supra*.

the sample beyond its melting point and then cooled it at a regular rate down to its freezing point. He then plotted a temperature-time curve and notice a plateau at the point where the sample crystallized.[419] Phillips's Fox testified that this behavior was typical of a crystalline material. At first, the temperature decreases "fairly rapidly"[420] as heat is lost to the surrounding medium. At the point where freezing occurs, however, the temperature stops changing:

> [T]he process of changing from an amorphous liquid to a crystalline solid involves giving off heat because the crystalline solid has a lower heat content than the amorphous liquid. [T]here is [therefore] a source of heat internally as the phase change occurs from the amorphous liquid to the crystalline solid. And that heat has to be taken away before the temperature can fall. So long as the freezing is taking place there is extra heat that has to be taken away.... [A]fter freezing is complete . . . that source of heat isn't there any longer and the temperature will once again fall at a higher rate.[421]

Fox testified that this pattern was characteristic of a crystalline material and contrasted it with the temperature-time curve that would be produced by an amorphous substance which contains no thermal reservoir that would produce a similar transition point plateau.[422] The presence of a plateau in a temperature-time curve for PO-133 thus indicates that the sample contained substantial crystallinity.

The information that PO-133 was insoluble in such chemically similar solvents as pentane,[423] yet its inherent viscos-

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[419] Tr., pp. 233-34.

[420] *Id.*, p. 831.

[421] *Id.*, pp. 831-32.

[422] *Id.*, pp. 837, 840.

[423] Tr., pp. 3864-65.

ity was measured, further indicates that PO-133 was crystalline. As Fox explained:

> [W]hen polymer chemists . . . found a polymer sample that would not dissolve in a solvent which was chemically similar . . . they reckoned there were one or two possibilities: Either the polymer was cross-linked or it was a crystalline polymer.[424]

Fox continued:

> [T]he fact that an intrinsic viscosity was taken indicates that the polymer was soluble in a solvent at some temperature. Cross-linked polymers are never soluble in any solvent that doesn't chemically degrade it.
>
> So that of the two possibilities, the one that remains is that the polymer was crystalline, it is insoluble in certain solvents at room temperature but soluble in some solvent that was used to take the intrinsic viscosity.[425]

On the basis of all of this information, the Court finds that PO-133 was a crystalline polypropylene.

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[424] *Id.*, p. 808.

[425] *Id.*, p. 881. Montedison attempted to rebut Fox's testimony with that of Dr. Cecil Bawn. In contrast to Fox, however, Bawn seemed unsure of his testimony. Thus, Bawn asserted that there might be other possibilities besides crystallinity or crosslinking that would explan why PO-133 failed to dissolve in pentane. Tr., p. 3426. He failed to list any of them. The Court, is able to explain why PO-133 failed to dissolve in pentane only by assuming that it was crystalline or that it was cross-linked. Like that of Fox, Bawn's testimony further indicates that cross-linking was an unlikely explanation:

> Q. . . . Would you agree with me that cross-linked polymers won't be soluble?
>
> A. Generally this would be true. Lightly cross-linked may swell to give very viscous solutions, but not complete solubility.
>
> Q. And they wouldn't be soluble enough to get an intrinsic viscosity, would they?
>
> A. No."

Finally, PO-116 was crystalline polypropylene. By early December, 1952 Gallaugher had determined that the melting point of PO-116 was 267° ±5°F.(130±3°C.), and that its density was 0.906 g./cm.^{3}.[426]. Hogan later recorded this data along with the information that the viscosity of PO-116 was 0.422.[427] As with the product PO-133, this data, combined with the knowledge that PO-116 was a solid polypropylene insoluble in boiling methyl ethyl ketone strongly suggest that PO-116 was crystalline. In addition, Wiles studied infrared scan P-48 and concluded that PO-116 "had substantial crystallinity".[428]

The Court therefore finds that PO-116 as well as the other three products on which Phillips relies was crystalline polypropylene.

2. *Recognition of The Product.*

Recognition requires an inventor to appreciate that he has produced a new form of matter and to learn enough about the new form to justify the conclusion that it conforms to the limitations of the Count. Phillip's scientists clearly recognized that they had produced a new form of matter. Hogan characterized the June 5, 1952 production of a solid polypropylene as a "surprising result".[429] So surprising was this result, in fact, that the very next day Hogan submitted a "Patent Idea Record":

> In the polymerization of propylene over commonly used catalysts, such as phosphoric acid and nickel on

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[426] P-59, p. 23.

[427] Hogan could not say exactly when he recorded this data. He noted, however ,that it was recorded on the back of a lab notebook page dated November 14, 1952. P-14, pp. 90-91. Hogan estimated that he would have recorded this data within two weeks thereafter. Hogan Record, *supra* note 16, at p. 46.

[428] Tr., p. 2701.

[429] Hogan Record, *supra* note 16, at p. 12.

> silica-alumina, the polymer produced is liquid and contains little, if any, solid polymer.
>
> However, it has been discovered that . . . [a chromia and nickel oxide will produce] a catalyst . . . [in] a considerable amount of the product . . . [which is] solid [and] no doubt completely olefinic and is therefore a unique solid material. . . .[430]

Phillips subsequently stepped up the research program which had stemmed from this work.[431] This led to production of the four products on which Phillips bases its actual reduction to practice and its January 27, 1953 patent application claiming the production of "novel" solid polymers.[432]

Moreover, Phillips's scientists knew enough about their products to justify the conclusion that they conformed to the limitations of the Count. By January 27, 1953, Phillips's scientists had thus unambiguously characterized all four of its products as *solid*. Recognition of solidity was not challenged by the Board or by any of the parties.

Phillips also proved that by January 27, 1953 its scientists had learned enough about each of its products to justify the conclusion that the products were *polypropylenes, consisting essentially of recurring propylene units.* As early as July, 1952 Thornton had observed an infrared scan made from the products of Runs 4721-16 and 4721-26 and had noticed and recorded the recognition pattern characteristic of the product of the Count.[433] Montedison faults Thornton's report, claiming that it had "specifically and

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[430] *Id.;* P-10.

[431] *See* Hogan Record, *supra* note 16, at pp. 14-15.

[432] P-1, p. 1.

[433] *See* text accompanying note 393, *supra.*

unequivocally" ruled out the head-to-tail structure, that this limitation requires.[434] This report states:

> The absence of a band at 8.63 microns *eliminates structures of the type,* R—C—C—R.
>
> |
>
> C
>
> *Since we have eliminated the possibility of the structure* R(C—C)n—R as the prominent one and ahighly
>
> (|)
>
> (C)
>
> branched molecule is indicated (absence of bands at 12.7-13.9 microns) then the spectrum of the gel portion must indicate a pattern of branching. (emphasis in original).[435]

If Thornton had been required to describe the structure of Hogan's new polymer in the terms used in the Count, this Court might consider his apparent rejection of what later turned out to be the product's correct structure. Thornton was not required, however, to use the precise language of the Count in describing his new product.[436] Rather, he was only required to appreciate enough about the available infrared scans to justify the conclusion that Phillips's material was a polypropylene, consisting essentially of propylene units. Thornton satisfied this requirement by describing and appreciating that 4721-16 and -26 produced the infrared recognition pattern characteristic of crystallie polypropylene.

PO-133 presents a more difficult problem, since it was never subjected to infrared analysis. Infrared analysis, however, is not the only acceptable method of establishing

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[434] Montedison Brief, *supra* note 65, at p. 56.

[435] P-56, p. 8.

[436] *See* text acompanying note 64, *supra.*

recognition of the second limitation of the Count. Favorable comparison to products known to be composed essentially of recurring propylene units could also justify the conclusion that the product met this limitation. In the case of PO-133, Phillips has shown that its scientists knew that it had been produced in the same manner as the products of Runs 4721-16 and 26, that it was similarly a solid and soluble in pentane, and that it had the same density and boiling points as those materials. All of these properties correspond with those normally associated with the product of the Count. The opposing parties failed to cite a single example of a solid polypropylene having all of these characteristics that was not a polypropylene, consisting essentially of recurring propylene units. This Court accordingly finds that Phillips's scientists recognized enough about PO-133 to justify the conclusion that it was characterized by this feature.

This Court also finds that Phillips's scientists recognized by January 27, 1953 that the fourth product, PO-116, was a polypropylene consisting essentially of recurring propylene units. Frenzel appreciated by that date that an infrared scan of PO-116 showed the recognition pattern now known to be typical of recurring propylene units.[437] Moreover, Phillips's scientists gathered the same data regarding PO-116's physical properties that they gathered concerning those of PO-133. Since this data was sufficient to justify the conclusion that PO-133 complied with the Count's second limitation, it is also sufficient to justify the same conclusion regarding PO-116.

Finally, this Court finds that Phillips's scientists recognized by January 27, 1953 enough about their polymers to justify the conclusion that they had a *substantially crystalline polypropylene component.* In the case of the products of Runs 4721-16 and -26 this Court need only note that

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[437] *See* text accompanying notes 406, *supra.*

prior to January 27, 1953 Thornton identified the presence of the peaks at 10.03 and 11.85 microns in the infrared scans of these products. *Identification of the presence of these peaks in a infrared spectrum of a polypropylene is sufficient to justify the conclusion that the polypropylene is crystalline.*

Phillips also recognized that PO-133 was crystalline. By January 27, 1953 Phillips's scientists had measured the melting point for all of its products. Fox testified that this data clearly indicated that Phillips's PO-133 was crystalline.[438] Phillips also offers viscosity data gathered prior to May 22, 1953. As shown above, this information, in combination with density, melting point, and other solubility data, is sufficient to justify the conclusion that PO-133 was crystalline. Phillips's scientists thus recognized that PO-133 was crystalline by May 22, 1953.[439]

Phillips's scientists also recognized that PO-116 was crystalline. Although Frenzel failed to detect in P-49 the presence of the 11.85 micron band indicative of crystallinity, he did note the presence of the 10.03 band which is also indicative. Moreover, by January 27, 1953 Phillips's scientists had compiled a great deal of data regarding the physical properties of PO-116, including information concerning its density, melting point, inherent viscosity and solubility. Positive correlation between these data and those normally found for crystalline polypropylene, as well as similar data from Phillips's first two products, which were known to have a substantial crystalline content is, as in the case of PO-133 above, sufficient to justify the conclusion that PO-116 was crystalline. This Court accordingly finds that prior to January 27, 1953, Phillips's scientists recognized that PO-116 was crystalline.

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[438] *See* text accompanying note 419, *supra*.

[439] The adoption of this date as Phillip's priority date would still afford it the senior position in ths Interference.

Appendix B

3. Recognition of A Utility for The Product.

Phillips asserts that its inventors recognized that their new polymers were useful both as solid plastics and as wax modifiers. The Court finds that Phillips failed to meet the testing standards necessary to demonstrate utility as a solid plastic. Phillips did, however, prove that its scientists recognized enough about their new polymer to justify the conclusion that it was useful as a wax modifier.

Phillips offers DeVault's testimony that in molding polypropylene samples he formed an opinion that the new polymer was similar to the polyethylene samples: "I assumed that applications of this material . . . could be used in the same manner as polyethylene."[440] Phillips also showed that its polymers had viscosities in the range normally associated with useful polymers.[441] Phillips fails, however, to cite any evidence indicating the Young's modulus for its products. Moreover, although Phillips's scientists measured the melting point, Phillips cites no tests indicating that its polymers were stable at the temperatures requiring for molding. Phillips has therefore failed to prove that its testing showed that its products conformed to the utility requirements suggested by its own expert, Fox. The Court accordingly finds that Phillips failed to prove that its scientists knew enough about their product to conclude that it was useful as a solid plastic.[442]

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[440] Hogan Record, *supra* note 16, at p. 1032.

[441] Note 90, *supra*.

[442] This finding in no way weakens Phillip's constructive reduction to practice case, *infra*, at note 455. In addition to the information already cited, Phillips application disclosed that its polymer could be used in applicatons where any sold plastics are used. Phillips application also disclosed that its polymer was stable at very high temperatures, far above those used for molding. All of this information clearly discloses utility as a solid plastic.

Appendix B

Phillips's scientists realized from a very early date that the new product might be used as a wax modifier. Between November 23 and December 4, 1951 Axe subjected the product of Run 4721-26 to "preliminary" candle snapping tests in order to determine its properties as a modifier.[443] Axe described the test: "[O]ne of the simple and standard ways . . . of testing a candle in a candle factory is simply to mold the thing and break it. If it breaks with a loud snap you know that you have modified it [since, otherwise it] would have no snap at all. . . ."[444]

When the preliminary candle tests yielded encouraging results,[445] Phillips prepared sample PO-133 and submitted it to a commercial wax company, Moore and Munger, for more complete wax modification testing.[446] On May 8, 1952 John W. Padgett reported for Moore and Munger that "ourpreliminary work on a laboratory basis looks very encouraging in regard to wax modification and we would like to continue working with you on this development."[447]

Axe reported that Moore and Munger carried out the following tests on paper waxed with a composition containing Phillips's polypropylene:

> [S]eal strength, blocking temperature, gloss, gloss stability, scuff resistance and moisture-vapor transmission. Tensile strength was determined on molded wax modified with polypropylene. Using a modified Tinius Olsen machine, an unmodified wax having a tensile strength of 180 pounds per square inch on modification with 2 per cent of our most soluble sample was found

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[443] Hogan Record, *supra* note 16, at pp. 946-47; P-41.

[444] *Id.*, p. 946.

[445] P-41.

[446] P-42.

[447] P-43.

> to have a tensile strength of 352 pounds per square inch. This latter value compares with a value of 328 for commercial polyethylene in the same wax at the same concentration. [PO-133] was just as good as polyethylene. This increase of about 100 per cent in tensile strength is quite significant. Blocking tests were quite satisfactory with the polypropylene being the full equivalent of commercial polyethylene. Blocking temperature increases were of the order of 15 to 20 F in paraffin-micro wax blends containing from 7 to 8 per cent of polypropylene.[448]

By June 9, 1952 then, Phillips had submitted PO-133 for standard testing of at least seven properties relevant to utility as a wax modifier. All of these tests showed that PO-133 could be so used; in fact, they were so successful that Moore and Munger wanted to continue working with Phillips for commercial development of the product. On the basis of this information, the Court finds that by June 9, 1952, Phillips knew enough about its product to justify the conclusion that it was useful as a wax modifier.

Montedison argues[449] that Phillips's scientists failed to recognize utility as a wax modifier because they did not test whether the modified wax would burn.[450] Such testing, however, was unnecessary. As Axe testified: "We made hundreds of candles, but we very seldom burnt one. That is about the way it is in the art, too; we presumed they would burn."[451]

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[448] P-44. Axe generally received summary analyses from Moore and Munger rather than extensive numerical data since, as he explained, "[Moore and Munger's representative] wasn't one to tell you all his business, that was for sure." Hogan Record, *supra* note 16, at p. 953.

[449] Montedison's Brief, *supra* note 65, at p. 43.

[450] Hogan Record, *supra* note 16, at p. 947.

[451] *Id.*

Montedison and Du Pont also argue that Exhibits P-43, the report by Padgett to Axe evaluating the results of the tests performed on PO-133, and P-44, Axe's memorandum relating this information to Phillips, are inadmissible hearsay.[452] Phillips counters that these letters are admissible as business records.[453] Although there may be merit to Phillips's response, the Court finds the documents admissible under Federal Rule of Evidence § 803(24), which permits the admission of a statement not specifically covered by any other hearsay exception providing that the statement is trustworthy and addresses a material fact, other evidence is unavailable, justice requires the statement's admission, and the statement's proponent fairly notifies the adverse party of his intention to use the hearsay statement. Exhibits P-43 and P-44 clearly comply with these requirements. They are trustworthy, having been prepared by the central figures in Phillips's utility testing program at a time when the results were fresh in their minds. Although writings might occasionally be slanted in order to support litigation positions, there is no evidence of such slanting here, since the possibility of this Interference was not known at the time of the reports and the Interference was not declared until more than five years later. The Court is convinced that Phillips only goal was to conduct a thorough utility testing program in order to avoid investing in an unrewarding project.

Exhibits P-43 and P-44 address the material fact of whether Phillips's scientists recognized enough about their product to justify the conclusion that it was useful. Phillips's entitlement to an actual reduction to practice hinges on this question, and P-43 and P-44 are extremely probative. They show exactly what testing is necessary to indi-

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[452] Montedison's Brief, *supra* note 65, at p. 44.

[453] Phillips' Brief, *supra* note 131, at p. 42.

cate utility as a wax modifier, and they show that Phillips complied with these requirements. Although Phillips might have attempted to introduce more current depositions of Axe and Padgett in substitution for these memoranda, the Court doubts that such testimony would have provided information regarding the specific nature and results of Phillips's testing program that would have been superior to that contained in memoranda written concurrently with the testing, more than twenty-seven years ago.

Further, justice requires the admission of P-43 and P-44 since Phillips might otherwise be prevented from establishing the utility of its product which is clearly shown by these reliable documents.

Finally, this Court finds that Montedison and Du Pont have had ample notice and opportunity to prepare for the introduction of these documents. As early as March 7, 1965 Axe introduced and authenticated these documents into the Interference proceeding.[454] The objecting parties have thus had more than fourteen years to prepare responses.

The Court thus finds that Phillips has satisfied all the necessary conditions for admitting Exhibits P-43 and P-44 under Federal Rule of Evidence § 803(24). Consequently, the Court has relied upon them in finding that Phillips has established that it knew enough about PO-133 to justify the conclusion that its product had utility as a wax modifier. Since Phillips's other products were quite similar to PO-133, the Court finds that they too were useful as wax modifiers.

Phillips's Constructive Reduction to Practice.

1. Adequate Description.

Phillips concedes that its 1953 application failed to describe its invention in the precise language eventually used

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[454] Hogan Record, *supra* note 16, at pp. 950-54.

by the Examiner.[455] It nevertheless argues that its description is the legal equivalent of the language of the Count[456] and has offered a great deal of direct testimony in support of its claim showing that its application disclosed the product of the Count.

Phillips's application clearly described a *normally solid* polymer; in fact, the word "solid" appears in several places as a description of its invention. Because of this, plus the fact that none of the parties challenge Phillips on this point, the Court finds that the application adequately discloses solidity.

Phillips contends that the limitation *polypropylene, consisting essentially of recurring propylene units* was disclosed by the application's description of the temperature and pressure conditions under which the polymer was to be prepared from propylene:

> The temperature to be used in carrying out the polymerization reaction depends to some extent on various factors, such as the solvent, but normally ranges from about 150 to 450°F. The preferred range for propylene and higher 1-olefins is 150 to 250°F and that the ethylene is 275 to 375°F.
>
> . . . .
>
> The pressure must be high enough to maintain the diluent in the liquid phase and to assure that olefins not liquefied under these conditions are dissolved in the liquid phase in sufficient amount. This requires a pressure of at least 100 to 300 psig, depending on the feed and the temperature, and a pressure of approximately 500 psig is to be preferred.[457]

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[455] Phillips's Brief, *supra* note 131, at p. 57.

[456] *Id.*

[457] P-1, p. 5.

Fox testified that when propylene is polymerized under such mild conditions:

> [T]he polymer chemist would have expected that the polymer . . . obtained [would be] polypropylene with recurring propylene units.[458]

Phillips contends that the limitation of *substantial crystallinity* was disclosed by the specification in the application that:

> The solid [polypropylene] fraction is insoluble in pentane at room temperature. The solid material has a melting point in the range of 240 to 300°F., a density in the range of 0.90 to 0.95, an intrinsic viscosity in the range of 0.2 to 1.0, ... The melting point was determined from a cooling curve of temperature vs. time.[459]

Phillips buttresses its case with testimony of Fox, who extensively reviewed this data and concluded that the application necessarily described a polymer with "a substantial crystalline polypropylene content".[460] Phillips also produced Dr. William Bailey, who testified that the reference to a "melting point" distinctly disclosed a crystalline rather than an amorphous product:

> That was true in 1952. I was taught that in school. I was never confused between what a melting point was and what a glass transition [of an amorphous material] was, I have always taught all my students ex-

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[458] Tr., p. 885.

[459] P-1, pp. 30-31.

[460] Tr., p. 887.

actly what a melting point was and what a glass transition was and not to confuse them.[461]

In addition to the above testimony, Phillips introduced evidence that six independent research groups polymerized and produced a product complying with Phillips's disclosures, that always and inevitably confromed to the three limitations of the Count.[462]

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[461] Tr., p. 4045.

[462] Du Pont and Standard object to the introduction and use of testimony supporting some of these reproduction experiments. The basis of their objection is that the testimony was depositions taken in the '300 patent litigation, *infra* at note 691, in which Du Pont and Standard did not directly participate. Standard was, however, indirectly involved in that action, since one of the defendants in the '300 litigation was Amoco Chemical corporation, a wholly owned subsidiary of Standard, and during the '300 litigation Amoco was represented by the same attorneys that represent Standard in the present litigation. In the '300 litigation, Phillips's motive was to show the success of the repetition experiments performed by Montedison. Montedison's motive, like those of Du Pont and Standard in the instant action, was to show that these experiments were neither repetitious nor successful. Under the supervision of this Court, the parties aggressively questioned witnesses relative to the reproduction experiments. Montedison, for instance, consumed more than 200 pages of deposition and prepared many trial exhibits in examining Mazzanti on this issue. The record indicates and ths Court recalls that Du Pont's and Standard's interests were therefore ably and vigorously protected, and this Court finds it difficult to believe that Du Pont or Standard, if present, could have done more to attack these reproduction runs than was done by Montedison. Under these circumstances, this evidence is admissible under Federal Rule of Evidence 804(b).

This rule first requires that a declarant be unavailable. Phillips contends, without refutation, that the declarants, Italian citizens living in Italy, are unavailable. In this situation, their former testimony may be admitted "if the party against whom the testi-

(footnote continued on following page)

(footnote continued from preceding page)

mony is now offered, or . . . a predecessor in interest, had an opportunity and similar motive to develop the testimony for direct, cross or redirect examination." The Third Circuit recently clarified the meaning of the term "predecessor in interest" holding that the United States Coast Guard, which is charged with "vindicat[ing] the public interest in safe and unimpeded merchant marine service", was a predecessor in interest to an injured seaman seeking compensation for his injuries:

> "[T]he basic interest advanced by both was that of determining culpability and, if appropriate, exacting a penalty for the same condemned behavior thought to have occurred.
>
> . . . .
>
> Under these circumstances, the previous party having like motive to develop the testimony about the same material facts is, in the final analysis, a predecessor in interest to the present party."

Lloyd v. American Expert Lines, 580 F.2d 1179 (1978). Clearly Montedison was a predecessor in interest to Standard and Du Pont.

In addition to the runs cited below, Phillips also seeks to rely upon an experiment conducted by Montedison's Dr. Mario Fragiacomo. In explaining this experiment, however, Phillips failed to provide English language translations of Fragiacomo's Italian language notebooks, P-450 and P-451. Since this Court is not conversant in Italian, it is unable to rely upon these notebooks. This Court is aware of the mass of other materials generally cited by Phillips as relevant to the Fragiacomo runs, including more than 24 documents and more than 140 pages of scattershot deposition transcripts. Phillips' Proposed Findings of Fact and Conclusions of Law No. 259. This Court did not think it sufficiently important in view of the extensive record on this point to search through this material wthout more precise guidance from Phillips as to where reliable information may be found. Accordingly, the Fragiacomo runs have not been considered.

Phillips also asked this Court to consider a repetition run by Montedison's Domenico DeLuca. This run, however, produced a pentane insoluble product that boiled at 303°F. (156°C.). P-436, p. 2. This product therefore does not conform to the Phillips application which disclosed a product that melted below 300°F. Consequently, this run is irrelevant to the inherency issue.

Appendix B

A. Capucci's Spring Experiments.

In the spring of 1955 Montedison's Dr. Carlo Capucci performed the first set of reproduction experiments of which Runs 2, 4, and 13 are particularly relevant.[463] In all three runs Capucci first prepared a catalytic support containing 90% silica and 10% alumina.[464] In Run 2 he mounted on this support enough chromium nitrate so that the prepared catalyst contained 3% of chromia versus support;[465] in Run 4 he mounted chromium trioxide, impregnating the support to the same degree;[466] in Run 13 he used a slightly larger proportion of chromium nitrate.[467] In so doing, Capucci complied with the disclosures of Phillips's 1953 application, which provided:

> The supported chromium oxide . . . catalyst is usually prepared by impregnation of particulate silica, alumina, or silica-alumina with a solution of chromium oxide.
>
> . . . .
>
> . . . [These compounds include] Chromium trioxide, chromium nitrate, chromium chloride, chromium sulfate, and other soluble salts of chromium. The highest conversions were obtained from the catalyst that contained only chromium oxides after activation. Impreg-

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[463] P-425. Capucci never actually saw Phillips's 1953 application until much later, if at all, because American applications are not opened for public inspection until after they issue as patents. Rosenberg, Patent Law Fundamentals 17 (1975). Capucci relied however upon equivalent disclosures in Phillips' Belgian patent and Australian patent applications. *See* text accompanying notes 701-703, *infra*.

[464] P-425, pp. 1, 4, 7 and 18.

[465] *Id.*, p. 4.

[466] *Id.*, p. 7.

[467] *Id.*, p. 18.

> nation with chromium trioxide (CrO3) is preferred, although chromium nitrate may be used with similar results. . . . The amount of chromia in the catalyst may range from 0.1 to 10 or more weight per cent of the support. The preferred support is a silica-alumina composite containing a predominant portion of silica and a minor portion of alumina. One support that has been found particularly effective is a coprecipitated 90 per cent silica-10 percent alumina support.[468]

Capucci activated the catalyst in Run 2 by heating it three times, twice to 903°F.(500°C.) and once to 1472°F. (800°C.), in flowing dry air.[469] Capucci similarly activated the catalyst in Run 4 by heating it in flowing dry air for eight hours to temperatures ranging between 752°F. (400°C.), and 932°F.(500°C.).[470] In Run 13 Capucci heated the catalyst under flowing dry air to 932°F.(500°C.) for five hours and then to between 990°F.(530°C.), and 1000°F.(540°C.) for ten hours.[471] These procedures closely parallel those described in Phillips's 1953 application, which provided for: "drying and activation of the [catalyst] composite at a temperature in the range of 750 to 1500°F. for a period of 3 to 10 hours or more."[472]

In all of these experiments Capucci used a stirred autoclave reactor[473] as suggested by Example IV of Phillips's 1953 applicattion.[474] In further compliance with the appli-

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[468] P-1, p. 4.

[469] P-425, p. 4.

[470] P-425, p. 8.

[471] *Id.*, pp. 18-19.

[472] P-1, p. 4.

[473] P-425, pp. 4, 9 and 21.

[474] P-1, p. 11.

cation's disclosure of the use of relatively inert, non-deleterious hydrocarbon diluents[475] including isooctane and pentane,[476] Capucci used isooctane in Runs 2[477] and 4,[478] and a mixture of pentane and isooctaine in Rune 13.[479]

In Run 2 Capucci maintained the reactor at 208.4°F. (98°C.), and 382 psi for "one night".[480] Run 4 was made at 212°F. (100°C.), and 413 psi for twelve hours.[481] In Run 13 Capucci maintained a temperature of 201.2°F. (94°C.), and a pressure of 529 psi for twenty-two hours.[482] These reaction conditions comply with Phillips's 1953 disclosures cited above.[483]

Capucci followed standard experimental practice in separating his polymer, washing the product with generally

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[475] *Id.*, p. 6 Specifically, Phillips's application provided:

"Hydrocarbon diluents, preferably paraffins, serve as solvents for the polymer products to aid in the removal of the product from the catalyst in the reactor. The preferred diluents include aliphatic paraffins from 3 to 12 carbon atoms per molecule. Any of the paraffins which are solvents for the heavy polymer at temperatures in the operating range are suitable. Any hydrocarbon diluent which is relatively inert, non-deleterious, and liquid under the reaction conditions of the process may be utilized. Diluents that have been used successfully include propane, isobutane, normal pentane, isopentane, and isooctane. The heavier paraffinic diluents gave better results probably because they are better solvents for the heavy polymer."

[476] *Id.*

[477] P-425, p. 5.

[478] *Id.*, p. 9.

[479] *Id.*, p. 21.

[480] P-425, p. 5.

[481] *Id.*, p. 9.

[482] *Id.*, p. 21.

[483] *See* text accompanying notes 457 and 459, *supra.*

available hydrocarbon solvents including benzene[484] and toluene.[485] He then evaporated the solvents, a process which left a crude product. In these procedures, Capucci closely followed the suggestion in Phillips's application that the crude polymer be separated from the catalyst with a hydrocarbon solvent.[486] Capucci then fractionated this crude product by redissolving as much of it as he could in a solvent and then filtering out the purified polymer. In Runs 2 and 4 Capucci used a mixture of acetone and methanol as a solvent,[487] while in Run 13 he used acetone alone.[488] In these procedures Capucci varied slightly from the teachings of the Phillips 1953 application which suggested that the preferred solvents were pentane at room temperature or methyl isobutyl betone at 200°F. (94°C.).[489]

Careful study has shown that this variation is irrelevant; any of a variety of solvents might be used, and the selection of one over another was purely arbitrary.[490]

In sum, at least three of Capucci's Spring, 1955 runs closely followed the Phillips 1953 patent application disclosures. All of these runs yielded the product of the Count.[491]

B. Capucci's Autumn Experiments.

Capucci again followed Phillips's 1953 disclosures in two runs performed during the fall of 1955 and denominated A

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[484] P-425, pp. 5, 9.

[485] *Id.*, p. 21.

[486] Tr., p. 1266; P-1, p. 6.

[487] P-425, pp. 5, 9.

[488] *Id.*, p. 21.

[489] P-1, p. 29.

[490] Tr., pp. 2090, 2197-98.

[491] *See* P-425, p. MP-00717 (Run 2); P-427, p. 10 (Run 4); P-425, p. MP-000733 (Run 13). *See also* text at notes 706-12, *infra.*

and B. Insofar as either run produced a product that complied with Phillips's disclosures, that product was the product of the Count. In both A and B, he mounted chromium trioxide and strontium dinitrate[492] on a commercial silica-alumina support of up to three mls. granules. The resulting catalyst contained 83.78% silica, 9.13% alumina and 1.23% chromia.[493] Apparently the catalyst also contained some unreported amount of strontium.[494] Although the addition of strontium was not taught by Phillips's 1953 patent, its addition did not affect the resulting polymer.[495] Capucci activated Run A's catalyst by heating it under flowing dry air for ten hours at temperatures ranging between 932°F. (500°C.) and 1004°F. (580°C.),[496] and he activated Run B's catalyst by heating it under flowing dry air for more than five hours at temperatures ranging between 932°F. (500°C.) and 1076°F. (580°C.).[497] In Runs A and B, Capucci used a stirred autocalve reactor.[498] In both runs Capucci used isooctane as a diluent.[499] In Run A he polymerized polypropylene for twenty-four hours at temperatures ranging between 194°F. (90°C.) and 206.6°F. (97°C.), and at a pressure of 294 psi,[500] and in Run B he ran the polymerization for eight hours at a temperature of

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[492] P-756, p. 3.

[493] *Id.*, p. 9.

[494] *See* P-756, pp. 3, 9; Montedison's Brief, *supra* note 65, at p. 31.

[495] *See* text accompanying notes 663-64, *infra*.

[496] P-421, p. 1.

[497] P-421, pp. 7-8.

[498] *Id.*, pp. 2, 8; P-419, p. 9.

[499] *Id.*, pp. 2, 8.

[500] *Id.*, p. 3.

248°F. (120°C.) and a pressure of 617 psi.[501] In both runs Capucci removed his product from the catalyst using toluene,[502] and in Run B he used benzene as well.[503] He then evaporated some of the toluene and benzene,[504] dumped the remaining material into a solution of antisolvents such as cold acetone and methanol in Run A[505] and cold acetone and ether in Run B,[506] and filtered out the resulting crude precipitate. Finally, Capucci purified his product by dissolving as much of it as possible in hot acetone, in hot ether, and finally in hot heptane.[507] Although the latter extractions vary from those reported by Phillips, the differences are in significant.[508]

The resulting product was then subjected to testing, including infrared and x-ray analysis.[509] In both runs the undissolved product was determined to be a white "pulverulent" solid.[510] In Run A the product showed an inherent viscosity of 1.02,[511] which is outside the range of .2 to 1.0 specified by Phillips's 1953 patent application.[512] Since this reproduction experiment thus failed to produce a polymer complying exactly with the Phillips disclosures, it might be

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[501] *Id.*, p. 8.

[502] P-756, p. 12.

[503] P-421, p. 8.

[504] P-756, p. 13.

[505] *Id.*

[506] P-421, p. 8.

[507] P-756, p. 14.

[508] *See* text accompanying note 490, *supra.*

[509] P-756, p. 6.

[510] *Id.*, p. 14.

[511] P-756, Table 1.

[512] *See* text accompanying note 459, *supra.*

considered irrelevant to Phillips's case. A polymer chemist, however, would not be considered about this slight discrepancy.[513] A viscosity measurement only indicates the weight of a molecule of polymer and indicates nothing except as discussed above[514] about the molecule's structure or other physical properties. Since none of the parties mentioned this discrepancy as a possible basis for disregarding the product of Run A, the Court has concluded that the product complied with Phillips's disclosure.

Capucci contemporaneously recorded that this product yielded infrared spectra that were "very similar" to those produced by Natta's head-to-tail polypropylene, and that this indicated that the product was "highly crystalline".[515] At trial Phillips introduced Exhibit P-393, an x-ray scan of Run A's product.[516] Based upon this scan, Phillips's Dr. Gregg concluded that the product of Run A was "partially crystalline polypropylene".[517] These conclusions were confirmed by others at Montedison.

Run B's product showed a viscosity of 0.88,[518] well within the range specified in the application. Once again Capucci contemporaneously recorded that this product yielded infrared scans "very similar" to those of Natta's head-to-tail polypropylene and that it was "highly crystalline".[519] At trial Phillips introduced P-759, an infrared scan of Run B's product,[520] and according to Phillips's infrared expert

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[513] Tr., p. 880.

[514] *See* text accompanying note 425, *supra*.

[515] P-756, pp. 19-20.

[516] M-1268B, pp. 34-36; Tr., p. 2921.

[517] Tr., p. 2922.

[518] P-756, Table 1.

[519] P-756, pp. 19-20.

[520] Tr., p. 2730.

Wiles, this scan showed the familiar recognition patterns for a "polypropylene exhibiting substantial crystallinity."[521] This conclusion was confirmed by Montedison's scientists.

In sum, at least two of Capucci's Autumn 1955 runs closely followed Phillips's 1953 patent application. Both runs yielded a product that was a normally solid polypropylene, consisting essentially of recurring polypropylene units having a substantially crystalline polypropylene content.

C. Eleuterio.

Du Pont's Herbert S. Eleuterio also followed Phillips's application and obtained crystalline polypropylene in 1956. In these experiments, Eleuterio sought to follow the directions cited in Belgium Patent 530,317,[522] which was equivalent to Phillips's 1959 American application. Eleuterio mounted chromium nitrate on a silica-alumina support,[523] and produced a catalyst containing 4% chromium. He then activated the catalyst by heating it at 932°F.(500°C.) for twenty hours in an atmosphere of flowing dry air.[524] In his six hour polymerization run, Eleuterio used an autoclave reactor maintained at temperatures ranging between 194°F.(90°C.) and 212°F.(100°C.) and at a pressure of 5000 psi. Eleuterio used xylene as a diluent and also as a wash to separate the raw polymer from the catalyst. The xylene was then evaporated, leaving a crude product.

Eluterio recorded that this unfractionated product was 50% crystalline and that the Phillips process "makes a polypropylene which is similar to Natta's crystalline poly-

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[521] *Id.*

[522] P-287, p. 2. *See* note 702. *infra.*

[523] *Id.*, p. 9.

[524] *Id.*

propylene."[525] At trial Eleuterio confirmed his conclusion.[526] Phillips further supported this analysis by introducing infrared scan P-287A,[527] which, as Wiles testified,[528] showed the familiar recognition pattern for crystalline polypropylene.

D. Trada.

Dr. Gianni Trada of the Edison Company duplicated Phillips's disclosures in 1962. Trada mounted chromium trioxide on a catalyst support containing between 75% and 87% silica, the balance being alumina. The final catalyst contained about 2% chromium. Trada activated the catalyst by heating it to 932°F. (500°C.) for five hours in an atmosphere of flowing dry air. He then polymerized propylene in an autoclave reactor, maintaining pressures of between 220 and 838 psi at 204°F. (95°C.) for twelve hours.[529] Trada separated the resulting product from the catalyst using boiling xylene which he subsequently evaporated. He then dissolved as much of the polymer as he could in cold n-pentane and recovered the residue.

Trada reported that the product had an intrinsic viscosity of 1.31,[530] and that it was 57% crystalline.[531] The sample was subjected to infrared and x-ray analysis. Wiles testified that P-969, the infrared scan,[532] indicated

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[525] *Id.*

[526] Tr., pp. 3656-57.

[527] P-287, p. 9; Tr., P. 2725.

[528] Tr., pp. 2725-26.

[529] P-966, Table III.

[530] *See* text accompanying note 512, *supra*.

[531] P-966, Table V.

[532] r., p. 2750.

that the product was a polypropylene that was "substantially crystalline".[533]

Trada also dissolved as much of the polymer as he could in boiling n-heptane and separated the residue, which he analyzed. Its viscosity was 2.00,[534] and it was 55% crystalline.[535] Trada subjected this product to infrared analysis, producing scan P-994,[536] and to x-ray analysis, yielding scan P-976.[537] Wiles concluded from P-994 that Trada's product was a "polypropylene" having "substantial crystallinity",[538] and Gregg concluded from P-976 that the product was "partially crystalline polypropylene".[539]

E. Witt.

In 1963 Phillips's Donald Witt performed three more reproduction tests, designated Runs 22, 56, and 67, which produced crystalline polypropylene. In all three runs Witt mounted chromium trioxide on a commercial catalyst support[540] in granular form (14-28 mesh), containing 90% silica and 10% alumina.[541] In Run 22 Witt mounted 2.5% chromium;[542] in Run 56 he mounted 2.3% chromium;[543] and

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[533] *Id.*, pp. 2750-51.

[534] *See* text accompanying note 512, *supra*.

[535] P-966A, Table VI.

[536] Tr., p. 2751.

[537] *Id.*, p. 2976.

[538] *Id.*, p. 2752.

[539] *Id.*, p. 2976.

[540] P-61, pp. 22, 56, 60.

[541] *Id.*, p. 15.

[542] P-61, p. 22.

[543] *Id.*, p. 56.

in Run 67 the amount of chromium was not measured. Witt activated his catalyst by heating it for five hours to 1020°F. (549°C.) in Run 22.[544] In Runs 56 and 67 Witt followed a similar procedure, except that he heated the catalyst to a slightly higher temperature, 1100°F. (593°C.).[545]

In Runs 22[546] and 56[547] Witt used a fixed bed reactor while in Run 67 he used a stirred reactor.[548] Witt employed a mixture of propane and isopentane as diluents.[549] In Run 22 Witt reacted the propylene for six hours at 190°F. (88°C.) and at pressures ranging between 580 psi and 630 psi.[550] In Run 56 Witt reacted the propylene for six hours at 190°F. (88°C.) and at pressures ranging between 590 psi and 615 psi.[551] In Run 67 he reacted the propylene for five hours at 190°F. (88°C.) and at pressures ranging between 15 psi and 200 psi.[552] Witt separated the catalyst from the crude polymer and dried it.[553]

In Run 22 Witt dissolved as much of the crude polymer as he could in methyl isobutyl ketone at 200°F. (94°C.)[554] The remaining solid had a specific viscosity of 0.73.[555] Its

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[544] *Id.*, p. 17.

[545] *Id.*, pp. 52, 62.

[546] P-61, p. 21.

[547] *Id.*, p. 56.

[548] *Id.*, p. 67.

[549] *Id.*, pp. 22, 56, 67.

[550] *Id.*, pp. 22-23.

[551] *Id.*, pp. 56-57.

[552] *Id.*, p. 67.

[553] *Id.*, Hogan Record, *supra* note 16, at p. 2129.

[554] Hogan Record, *supra* note 16, at p. 2137.

[555] P-108, p. 9.

melting point was 257°F. (125°C.),[556] and its density was between 0.9068 g./cm.3[557] and 0.9077 g./cm.3.[558] This product was also subjected to infrared analysis, producing scan P-132,[559] and to x-ray analysis, producing scans P-141 and P-142.[560] Wiles testified that P-132 exhibited the normal recognition pattern for a "polypropylene" having "substantial crystallinity".[561] Gregg testified that the scans P-141 and P-142 exhibited the normal recognition pattern for crystalline polypropylene.[562] In fact, they showed that this product was between 46.6% and 48.9% crystalline.

In Run 56 Witt dissolved as much of the polymer as he could in isobutyl ketone heated to 200°F. (94°C.).[563] The melting point of the remaining residue was 266°F. (130°C.), [564] its inherent viscosity was 0.95,[565] and its density was between 0.9095 g./cm.3 and 0.9099 g./cm.3.[566] This product was subjected to infrared analysis, producing scan P-127[567] which Wiles concluded exhibited the normal recog-

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[556] P-109.

[557] P-141.

[558] P-142.

[559] Hogan Record, *supra* note 16, at p. 3477.

[560] Hogan Record, *supra* note 16, at p. 3806.

[561] Tr., pp. 2664-65.

[562] *Id.*, pp. 2876, 2893.

[563] Hogan Record, *supra* note 16 ,at p. 2143.

[564] P-110. Phillips contends that the density of this polymer was found to be about 0.9095 g./cm.3. This Court, however, has been unable to locate the information upon which this contention was based. Accordingly, this Court renders no decision on this point.

[565] P-108, p. 10.

[566] P-143.

[567] Hogan Record, *supra* note 16 ,at p. 3459; Tr., p. 2687.

nition pattern for crystalline polypropylene.[568] It was also subjected to x-ray analysis producing scan P-143[569] which Gregg testified exhibited the normal scattering pattern for crysalline polypropylene.[570] In fact, this scan shows that this product was 54.8% crystalline.[571]

Run 67 produced four solid products. The first was the residue remaining after Phillips's scientists dissolved all of the crude product that they could in methyl isobutyl ketone at 197°F.(93°C.).[572] Its density was 0.9019 g./cm.^{3},[573] and it was reported to be 36.7% crystalline.[574] P-145 is an x-ray scan of this product[575] which according to Gregg exhibited the diffraction pattern characteristic of crystalline polypropylene.[576] Run 67's second product was insoluble in methyl isobutyl ketone at 200°F.(94°C.).[577] Its density was 0.9042 g.cm.^{3}[578] and it was reported to be 40.3% crystalline.[579] P-147 is an x-ray scan of this product[580] which according to Gregg exhibited the normal diffraction pattern for crystalline polypropylene.[581] The

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[568] Tr., p. 2687.

[569] Hogan Record, *supra* note 16, at p. 3824; Tr. p. 2875.

[570] Tr., p. 2895.

[571] *Id.*, p. 2906.

[572] P-75, 8.

[573] P-145.

[574] *Id.*

[575] Hogan Record, *supra* note 16, at p. 3825; Tr. p. 2909.

[576] Tr., p. 2910.

[577] P-75, p. 5.

[578] P-147.

[579] *Id.*

[580] Hogan Record, *supra* note 16, at p. 3825; Tr., p. 2910.

[581] Tr., p. 2910.

third solid product of Run 67 was insoluble in pentane at room temperature.[582] Its density was 0.9086 g.cm^3,[583] and it was reported to be 44.5% crystalline.[584] P-144 is an x-ray scan of this product[585] which according to Gregg exhibited the diffraction pattern characteristic of crystalline polypropylene.[586] Finally, Witt prepared a fourth solid product which was insoluble in boiling heptane.[587] Its density was 0.9162 g.cm.^{3} [588] and it was reported to be 48.2% crystalline.[589] It too produceed an x-ray scan, P-146,[590] which Gregg analyzed as exhibiting the diffraction pattern characteristic of crystalline polypropylene.[591]

F. DeLap.

Phillips's Joseph A. DeLap conducted yet another repetition experiment that produced crystalline polypropylene in December 1964. In this experiment DeLap mounted chromium trioxide[592] on a catalyst support prepared by Phillips.[593] This support, which was granular (14-28

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[582] P-75, p. 6.

[583] P-144.

[584] *Id.*

[585] Hogan Record, *supra* note 16, at p. 3825; Tr., pp. 2906-07.

[586] Tr., p. 2907.

[587] P-75, p. 9.

[588] P-146.

[589] P-146.

[590] Hogan Record, *supra* note 16, at p. 3825; Tr., pp. 2909-10.

[591] Tr. pp. 2909-10.

[592] P-85, p. 2.

[593] P-83.

mesh),[594] contained 89.3% silica and 10.6% alumina.[595] As finally prepared, the catalyst contained 3.1% chromium.[596] DeLap activated the catalyst by heating it to 1020°F.(559°C.) for five hours in an atmosphere of flowing dry air.[597] DeLap used a fixed bed reactor,[598] and a mixture of propane and isopentane as a diluent.[599] During the six hour polymerization run he maintained the reactor at 190°F.(88°C.) and at pressures ranging between 570 psi and 640 psi.[600] DeeLap separated the catalyst from the crude product, evaporated the diluent,[601] and then dissolved as much of the crude product as he could in methyl isobutyl ketone at 200°F.(93°C.),[602]

The intrinsic viscosity of the residue product was found to be 0.68,[603] its melting points 248.9°F. (120°C.),[604] and its crystallinity content 51.6%.[605]

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[594] *Id.*, p. 9.

[595] *Id.*, p. 10.

[596] P-87.

[597] P-85, pp. 4, 11.

[598] *Id.*, p. 5.

[599] *Id.*, p. 6.

[600] *Id.*, pp. 8, 14.

[601] *Id.*

[602] *Id.*, p. 16.

[603] P-108, p. 14. Phillips also insists that the density of this material was found to be between 0.9054 g./cm.^{3} and 0-9117 g./cm.^{3}. Once agains Phillips failed to cite the specific source of this information which is apparently contained somewhere within a collection of twenty-seven exhibits and more than 250 pages of deposition. Phillips's Proposed Findings of Fact and Conclusions of Law, Part I Priority and '721 Issues, No. 207. Since this Court is far too busy to spend its time searching through piles of materials without some clue as to the location of the relevant information, it will refuse to find this fact.

[604] *Id.*, p. 11.

[605] P-148.

Appendix B

Wiles analyzed P-133, the product's infrared scan,[606] and identified the usual recognition pattern of crystalline polypropylene.[607] Gregg testified that P-148, the product's x-ray scan,[608] showed a diffraction pattern characteristic of crystalline polypropylene.[609]

G. Longi.

In 1965, Montedison's Dr. Paoli Longi performed a final set of reproduction experiments at the request of Montedison's Patent Department.[610] These experiments included Runs MB-34/35, MB-38, and MB-60/86, yielding crystalline polypropylene. In Runs MB-34/35[611] and MB-38[612] Longi mounted chromium nitrate on a granular support (14-28 mesh) containing 87.3% silica and 12.4% alumina. The resulting catalyst contained 2.77% chromium. In Run MB-60-86[613] he mounted chromium oxide on the same support, producing a catalyst containing 2% chromium.[614] Longi activated the first two catalysts by heating them for six hours at temperatures ranging between 900°F. (480°C.) and

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[606] Hogan Record, *supra* note 16, at pp. 3487-88; Tr., p. 2696.

[607] Tr., p. 2696.

[608] Hogan Record, *supra* note 16, at p. 3825; Tr., p. 2912.

[609] Tr., p. 2912.

[610] *Id.*, pp. 1491-524.

[611] P-500, p. MP-00780.

[612] *Id.*, p. 61.

[613] Phillips claims this run was actually two separate runs. Exhibit A, Phillips' Proposed Findings of Fact. The Court has been unable to discover the source of this information, finding only enough data to show that one run, which it has labelled 60/86, was done.

[614] P-500, p.MP-00789; P-506, p. 1.

930°F. (500°C.) in an atmosphere of flowing dry air.[615] He activated the other catalyst by heating it to 994°F. (590°C.)[616] for five hours in an atmosphere of flowing dry air.[617] In all these experiments Longi used an autoclave reactor,[618] and as a diluent n-heptane.[619] In the first experiment he polymerized propylene for twenty hours at temperatures ranging between 190°F. (88°C.) and 194°F. (90°C.), and pressures ranging between 228 psi and 331 psi;[620] in the second he polymerized propylene for two hours at temperatures ranging between 190°F. (88°C.) and 194°F. (90°C.) and pressures ranging between 287 psi and 456 psi;[621] and in the third experiment Longi polymerized propylene for five hours at temperatures ranging between 190°F. (88°C.) and 194°F. (90°C.).[622] Longi washed the product of the first experiment from the catalyst with xylene at 248°F. (120°C.), added a mixture of acetone and methanol, and filtered out the resulting crude precipitate.[623]

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[615] P-500, p.MP-00780.

[616] P-506 indicates that activation was carried out at a temperature of 110°F. which is equated to 590°C., an obvious mistake. Since 110°F. seems like a very low activation temperature, the Court has assumed that the 590°C. temperature is accurate. It is possible that Longi made an error in converting this temperature from the Centigrate scale with which he was familiar, to the English (Fahrenheit) system.

[617] P-506, p. 1.

[618] *Id.*

[619] P-500, pp. MP-00781, MP-00783; P-506, p. 1.

[620] P-500, p. MP-00781.

[621] *Id.*, p.MP-00783.

[622] P-506, p. 2. Phillips contends that the pressure ranged between 43 and 62 psi Exhibit A, Phillips's Findings of Fact. This Court, however, was unable to discover the source of this information.

[623] P-500, p. MP-00781.

The methods used in the second experiment are not recorded.[624] In the third experiment he washed the product from the catalyst with xylene at 266°F. (130°C.),[625] added cold methanol to the solution, and filtered out the resulting crude precipitate.

Longi isolated two solid products from the crude product of Run MB-34/35, only one of which is relevant as a reproduction experiment.[626] This product was insoluble in heptane, and its intrinsic viscosity was 1.57.[627] Its melting point was 333°F. (167°C.). Although this temperature is outside the range disclosed by Phillips's application, the higher melting point may have resulted from Longi's fractionation with heptane instead of the specific solvents mentioned by Phillips's application. Heptane residues generally melt at higher temperatures than pentane residues, although both are solid crystalline polypropylenes.[628] In light of this fact, plus the lack of objection by any parties to this experiment on this ground, the Court has considered this product. Longi reported that the crystallinity was 82.8%.[629] Phillips did not introduce evidence that infrared or x-ray analysis were performed on this product.

Longi also isolated two solid products from Run MB-38. The first was insoluble in methyl isobutyl ketone at 82°F. (28°C.) The viscosity of this material was 0.57, and its

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[624] *Id.*, p. MP-00783.

[625] P-506, p. 2.

[626] The other product, which was fractionated with methyl isobutyl ketone, as disclosed by Phillip's application, melted at 318.2°F. (159°C.). P-500, p. MP-00782. This temperature is outside the range disclosed by the application.

[627] *See* text accompanying note 512, *supra*.

[628] P-946, p. 221.

[629] P-500, p. MP-00781.

melting point was 325°F. (163°C.). The other product was insoluble in methyl isobutyl ketone at 200°F. (94°C.). Longi reported no other data for this material except that it was a "normal isotactic polypropylene".[630]

Longi isolated three solid products from Run 60/86, only one of which is relevant as reproduction experiment.[631] This solid product was insoluble in heptane. Its intrinsic viscosity was 1.73,[632] its melting point was 332.6°F. (167°C.),[633] and Longi reported that it was 71.5% crystalline.[634] That this product was crystalline polypropylene was confirmed by Wiles, who analyzed an infrared scan of the product, P-742,[635] and by Gregg, who analyzed an x-ray scan of the product, P-412.[636]

In sum, Phillips showed that at least six experiments attempted to duplicate its 1953 disclosures and that each of them produced a product which, insofar as its properties were measured and reported, complied with the requirements of Phillips's application. That product always and invariably satisfied the limitations of the Count. This evidence, especially when combined with the testimony of Fox

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[630] *Id.*, p. MP-00785.

[631] Longi fractionated the first product wtih pentane at 75°F. (24°C.). Its melting point, however, was 321.8°F. (164°C.), P-506, Tabella 1, and thus was outside the range disclosed by Phillips's application. Longi fractionated the second product with methyl isobutyl ketone at 200°F. (94°C.). Its melting point was 327.2°F. (164°C.), which was also outside the range disclosed by Phillips's application. *Id.* See text accompanying note 459, *supra.*

[632] *See* text accompanying note 512, *supra.*

[633] *See* text accompanying note 628, *supra.*

[634] P-506, Tabella 1.

[635] Tr., pp. 2743-44.

[636] *Id.*, p. 2952; M-1268, pp. 78-80.

and Bailey regarding the direct disclosures of the Phillips applications, convinces the Court that Phillips's 1953 application disclosed crystalline polypropylene. This finding is particularly justified by the failure of the other parties to cite a single instance of the production of a material that complied with Phillips's description that was not crystalline polypropylene.

Montedison attacks Phillips 1953 application, contending that it failed to disclose the entire class of compounds covered by the Count.[637] The application specified that the molecular weight of its product was "approximately 5000 to 20,000",[638] which Montedison contends is inadequate to include products falling within the Count having molecular weights of up to 50,000.[639] As Fox testified, however, in 1953 scientists gave far less credence to molecular weight esetimates than to the intrinsic viscosity measurements from which they were calculated. This was so because the calculation used, known as the Staudinger rule or relation-

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[637] Montedison's Brief, *supra* note 65, at pp. 16-17. It is unclear that Phillips must disclose an entire class of products in order to establish priority over a single member. *See* Mikus v. Wachtel, 504 F.2d 1150 (C.C.P.A. 1974); Petisi v. Rennhard, 363 F.2d 903 (C.C.P.A. 1966). The Court could decide this priority issue on the law. As discussed below, however, this case involves patentability issues as well, *infra* at text accompanying note 818, one of which concerns the breadth of Phillip's 1953 specification and claims. 35 U.S.C. § 112. In particular, Phillips may not be entitled to patent the full range of crystalling polypropylenes unless its 1953 application specified all of them. The Court therefore must eventually address the issue of the breadth of Phillips's specification. Since the evidence is equally relevant to Montedison's present argument, the Court has decided to address both issues here.

[638] P-1, p. 31.

[639] Phillips's 1956 application, through which Phillips entered the Interference, does disclose products with molecular weight "in the range 900 to 50,000 and higher". D-648, p. 12.

ship, was notoriously unreliable. As early as 1948 one reliable textbook thus reported:

> [E]ven extropolation to infinite dilution is not sufficient to eliminate shortcomings and limitations arising from the Staudinger rule. . . . It is unfortunate, therefore, that the literature contains so many molecular-weight values based on the Staudinger Rule and Staudinger "constants". Many of these values are seriously in error. Owing to this uncertainty, high polymers are now frequently characterized by their intrinsic viscosities, the results not being converted into molecular weights.[640]

In reading Phillips's application, then, it is clear that a polymer scientist would have disregarded the molecular weight value in favor of the viscosity measurements made in the laboratory.[641]

Montedison next argues that Phillips's use of the term "melting point" was vague and ambiguous and did not adequately disclose crystallinity because Phillips used the term interchangeably with "softening point" which had a wide variety of meanings and was applied to amorphous polymers as well as crystalline polymers.[642] Montedison also argues that Phillips cannot rely upon its 1953 disclosure that the density of its propylene polymer was in the range of 0.90 g./cm.^{3} to 0.95 g./cm.^{3} in order to prove crystallinity.[643] According to Montedision, in 1953 scientists knew of a large number of amorphous materials having densities in this range, and since no one had re-

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[640] P-1369, p. 249. *See also* P-3170, pp. 52-53.

[641] *See* Tr., p. 880.

[642] Montedison's Brief, *supra* note 65, at p. 22.

[643] *Id.*, p. 26.

ported by that time that the density of amorphous polypropylene was outside this range, it would have been impossible to say whether Phillips's rather dense propylene polymer was amorphous or crystalline. Assuming *arguendo* that these narrow objections are valid, they do not prove that Phillips's disclosure was legally insufficient. In addition to Bailey's testimony regarding the meaning of "melting point" and the density data, Phillips submitted a great deal of other evidence concerning the significance of solubility, viscosity, and melting point determinations. Phillips also submitted the great variety of repetition experiments. All this evidence taken together clearly establishes the legal sufficiency of Phillips's 1953 description.

Montedison next attacks Phillips's application for its failure to establish a specific degree of crystallinity for the produet.[644] In particular, Montedison argues that the mere existence of a plateau in the cooling curve measurements is not evidence of substantial crystallinity because even inconsequential crystallinity can cause a small "blip" of a plateau in the graph.[645] These objections are not well taken. Fox testified that a technician would not report the existence of a freezing point unless he found a plateau indicating a substantial amount of crystallinity.[646] Moreover, the fact that the crystalline latticework was sufficiently strong to prevent Phillips's polymer from dissolving in a number of organic solvents including pentane indicates that the crystallinity was substantial. Also, the quantity of repetition experiments resulting in the production of propylene polymers containing very substantial amounts of crystallinity is strong evidence that Phillips's

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[644] Montedisons' Brief, *supra* note 65, at p. 25.

[645] Tr., pp. 938-39.

[646] *Id.*

1953 application described a substantially crystalline polypropylene.

Montedison finally claims that Phillips's application not only failed to disclosed that its polymer was composed essentially of recurring propylene units, but in fact taught away from this disclosure.[647] Phillips's application did state that its propylene samples were unsaturated,*i.e.*, that they contained double bonds.[648] In context, however, Phillips's description is not inconsistent with a polymer containing essentially recurring propylene units because its application also discloses that none of the molecules examined contained more than approximately 2.4 such double bonds per molecule. Fox testified that since the total number of recurring units in these molecules was greater than 400, it is justifiable to conclude that a skilled polymer chemist would have known that Phillips's scientists were discussing a "minor feature" of the structure in their polymers.[649]

2. Enablement.

Bailey reviewed these reproduction runs and testified that Phillips's application disclosed sufficient information to enable production of the product of the Count:

> [W]hen I read the application I was convinced that there was a process here, and after going through all this reproduction work there are eight different groups of research chemists working for four different companies on two different continents that had access to different equipment, different purities of materials, different backgrounds, and they were all able to even-

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[647] Montedison's Brief, *supra* note 65, at p. 27.

[648] P-1, pp. 31-32.

[649] Tr., p. 3939.

> tually produce a solid crystalline polypropylene as indicated [by Phillips's application], and the study of these reproductions then reinforces very strongly my conclusion that there is definitely a process disclosed in the application for producing the solid material [by Phillips's application].[650]

Montedison argues that Phillips's 1953 application failed to disclose sufficient information to enable a person skilled in the revelant art to make the product as required by 35 U.S.C. § 112.[651] Specifically, Montedison claims that the application failed to disclose three allegedly important processing requirements. The first requirement is that water vapor must be excluded from the pressure of the catalyst during activation and in subsequent handling. Phillips's 1953 application did teach that the catalyst should be activated at elevated temperatures in flowing air,[652] and that the catalyst should be regenerated in flowing "dry air".[653] Based on these teachings, Bailey concluded that "one skilled in the art would have certainly taken precautions to remove as much of the water from the flowing dry air as possible."[654] He also testified that it should have been obvious to someone skilled in the art that the catalyst was "very hydroscopic".[655] Precautions against exposing it to moisture would therefore have been superfluous.

Montedison attempted to rebut Bailey's testimony by introducing a patent for a process for "cracking" or

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[650] Tr., pp. 2219-20.

[651] Montedison's Brief, *supra* note 65, at pp. 17-19.

[652] Tr., p. 1727

[653] P-1, p. 8.

[654] Tr., p. 1727.

[655] *Id.*, pp. 1734-35.

breaking up heavy crude oil molecules and forming lighter molecules of gasoline that suggested the use of steam for cleaning soot from silica-alumina catalysts.[656] Montedison failed, however, to present a single witness, expert or otherwise, to testify that the art of cracking crude oils was at all relevant to the art of building large molecules by polymerizing light propylene molecules. Indeed, the two processes appear to vary a great deal: propylene is polymerized at moderate temperatures below 300°F., while petroleum is cracked at much higher temperatures.[657] Since in the notably unpredictable fields of catalysis and organic chemistry small changes can yield quite significant results,[658] Montedison's unsupported request to apply the crude oil cracking art to propylene polymerization is of no moment.

Montedison also insists that Example X of Phillips's 1953 Application favored exposing the catalyst to moist air. In relevant part, Example X states:

> EFFECT OF AGING OF CATALYST WITH DRY AIR AND WITH WET AIR
>
> To study the effects of prolonged treatment of the catalyst with dry air and with wet air at elevated temperatures, such as would be encountered in repeated regenerations, the catalysts were aged 88 hours at 1100°F. and 1300°F. with dry air and at 1100°F. with air saturated with water vapor at 100°F. At the end of the aging period with the wet air, which contained about 6.5 per cent water vapor, the catalyst was swept with dry air for five hours at 1100°F. Results

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[656] P-1196; Tr., pp. 2435-44.

[657] Tr., p. 1973.

[658] Levenspiel, Chemical Reaction Engineering 33 (2d Ed. 1972).

of the polymerization tests on these catalyst and similar data on unaged catalyst are shown in Table XII. . . .

TABLE XII

CATALYST TREATMENT			POLYMERIZATION TEST	POLYMER ANALYSIS
Temp. °F	*Gas*	*Time Hrs.*	*Average C_3H_6 Conv., %*	*MIBK Insoluble at 200°F. Wt. %*
1100	Dry Air	5	98	4.4
1100	Dry Air	88	99	2.2
1100	Wet Air**	88	55	5.1
1300	Dry Air	5	98	2.4
1300	Dry Air	88	98	2.5

* Wet air contained about 6.5 per cent water vapor. Catalyst was flushed with dry air for five hours at 100°F. after the wet air treatment.[659]

Montedison maintains that although the water-exposed catalyst converted propylene less efficiently, this deficiency was compensated for by its higher selectivity in the production of a solid product. On balance, exposure of the catalyst to water does serve to increase slightly the yield of solid product. Montedison assumed that such an increase is desirable and argues that the 1953 application implicitly taught the use of water-exposed catalysts.[660] This argument fails for a variety of reasons. Example X states that its purpose is to study the implicitly undesirable "effects of aging of [the] catalysts". The purpose of prolonged exposure of the catalyst to water vapor was to age it artificially; Phillips never suggested such exposure as a technique for increasing product yields. Moreover,

[659] P-1, p. 19.

[660] Montedison's Findings of Fact, *supra* note 216, at No. 805.

Appendix B

Montedison's assumption that increased solid production is in all cases desirable is inaccurate. Chemical plant design hinges upon a variety of economic considerations. When feed materials are expensive, for instance, a highly selective catalyst that uses less feed is desirable, while when reactors are expensive, use of reactor space is put at a premium, and more efficient catalysts able to convert increased quantities of feed are preferred. Until all the considerations have been explored, it is impossible to say whether a more selective but less efficient catalyst is better than one with the opposite qualities.[661] The underlying premise of Montedison's argument is, therefore, unjustified and its argument unacceptable.

Montedison next argues that Phillips's 1953 application failed to include the allegedly necessary teaching that strontium should be added to the catalyst.[662] In fact, this addition is quite unnecessary to the production of crystalline polypropylene, although it apparently extends the useful life of the catalyst. As Bailey testified:

> The function of the strontium in this connection is to stabilize the catalyst so as to prolong its life but not to change either the character or the type of polymer that is obtained.[663]

Similarly, Phillips witness Professor Herman Pines, testified:

> The purpose of using strontium, as I understand it, was to extend the active life of the catalyst. . . .
> . . . .

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[661] Peters & Timmerhaus, Plant Design and Economics for Chemical Engineers 1-156, 281-340 (2d Ed. 1968).

[662] Montedison's Findings of Fact, *supra* note 216, at Nos. 813-14.

[663] Tr., pp. 1310-11.

> [P]robably the strontium does not enter actively into polymerization reactions.[664]

Montedison also argues that Phillips's 1953 application failed to include an allegedly necessary precaution against poisoning the activated catalyst by exposing it to air or oxygen.[665] Once again Montedison has failed to produce any evidence showing that this teaching is necessary, and in fact, Phillips produced a great deal of evidence indicating that such a precaution was quite unnecessary. For example, DeLap testified that "dry air would have been [a] satisfactory medium in which to store the activated catalyst."[666] Similarly, Bailey testified:

> I saw no evidence in any of the reproduction work that if you cooled under air, dry air, that it would not work. So I think one skilled in the art would have assumed . . . that you could cool under—in the presence of oxygen providing you removed the oxygen later on during the polymerization.[667]

Even Bawn, Montedison's own witness, testified:

> I don't understand why if you activate a catalyst in oxygen, when you're dealing with an oxide in a highly oxidative state, why you cannot cool that catalyst in the same air or same oxygen as you used for activation. After all, you are in an oxidizing atmosphere in preparing the catalyst. Why can't you cool in oxygen?

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[664] Id., pp. 2369, 2373. *See also* Tr., pp. 2005-06; P-756, pp. 831-32.

[665] Montedison's Findings of Fact, *supra* note 216, at Nos. 807, 811.

[666] Hogan Record, *supra* note 16, at pp. 3029-30.

[667] Tr., pp. 4042-43.

> I don't understand why you would have to change the medium.[668]

Montedison further argues that Phillips's 1953 application failed to teach that only relatively pure propylene should be used for polymerization.[669] Bailey testified, however, that one skilled in the art in 1952 would naturally have used as pure a propylene as was available:

> I think no publication of any type, cautions that you must use pure materials. That's taken for granted in any scientific thing. If you want to get a pure product, you start with pure materials. And that's so elementary that I don't think anyone would put that precaution in there.[670]

Finally, Montedison challenges Phillips's 1953 application for failing to disclose the best mode for practicing the invention, arguing that:

> (a) the 1953 application did not disclose any of four runs relied upon by Phillips as a reduction to practice of the invention of the count.
>
> (b) the 1953 application did not teach what Hogan and Banks then believed to be the proper practice, i.e., preventing poisoning due to water and oxygen, by activating in substantially anhydrous air, and storing out of contact with moisture, using prepurified nitrogen. Although Phillips' licensees were advised in confidence of the poisoning effect of moisture, the 1953 applica-

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[668] Tr., pp. 3126-27.

[669] Montedison's Findings of Fact, *supra* note 216, at Nos. 240-42.

[670] Tr., p. 1736.

tion actually taught that moisture was beneficial for the production of solid polymer.

(c) the 1953 application did not teach what substances served as catalyst poisons, despite Hogan's knowledge that different catalysts are poisoned by different materials.[671]

Each of these arguments is rejected. The problem with Montedison's first argument is that evidence was not adduced that Phillips's inventors knew that any of their four actual runs produced materially better results than the procedures specified by the application. Nor did Montedison introduce any evidence that Phillips's inventors intentionally concealed this knowledge. Montedison's other two arguments fail because Phillips's inventors are not required to describe information that was already well known to polymer scientists.

3. Utility.

In order to establish that the 1953 application disclosed a specific utility for its product, Phillips cited in its disclosure that:

> The solid polymers and copolymers of the invention have utility in applications where any of the solid plastics are used.[672]

Fox testified that in 1952 this sentence would have indicated to a person skilled in the art of polymer science:

> [T]hat this polymer could be used where polymer plastics are used, and the polymer plastics of com-

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[671] Montedison's Brief, *supra* note 65, at p. 18.

[672] P-1, p. 4.

> merce are materials of [Young's] modulus in [the] range . . . [of] 10 to the 11th, 10 to the 9th, in that range,[673]

In addition, the patent application disclosed that Phillips's product was thermally stable, a property essential to utility as a molded plastic. In column twenty-five the appication disclosed that the decomposition temperature of polypropylene was 700°F. (360°C.). Acording to Fox, this information:

> [T]ells me that it is stable to a much higher temperature than the melting point, which is 240 to 300 Fahrenheit, and this says it is stable at 700 Fahrenheit. Therefore it tells me that it will be stable at temperatures that you would normally use for molding [which] Professor Bawn characerized as perhaps 50 degrees above the melting point.[674]

Fox further testified that the solidity, density, and viscosity measurements disclosed in the application showed that it was so similar to other commercial plastics as to be highly useful.[675] In sum, Fox concluded:

> [T]here is no question that from this material you could mold a button, a poker chip, a rod, a sheet—there is no question that you could extrude filaments . . . and such filaments could be used, for example, as insulation for noise and for heat.[676]

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[673] Tr., pp. 891-93.

[674] *Id.*, p. 3894.

[675] *Id.*, pp. 894-95.

[676] *Id.*, p. 3898.

Appendix B

Based upon the foregoing analysis the Court finds that Phillips's Application No. 33,567 supports a constructive reduction to practice priority date of January 27, 1953.

While the Court has stated that Phillips need only prove its case by a preponderance of the evidence because fraud by Montedison affected the Board's determination of its historical date of priority, Phillips's entire case is so clear and convincing thht it also meets the higher standard enunciated in *Morgan v. Daniels* as necessary to overrule the Board's Opinion in the absence of fraud.

FRAUD INTRODUCTION

All three plaintiffs allege that Montedison perpetrated fraud on the Board by misrepresenting o. suppressing information concerning the products produced by the parties. Phillips further alleges fraud in connection with Montedison's failure to produce certain documents during discovery. Allegations of inequitable conduct are raised against Phillips by Du Pont and Montedison.

None of the fraud claims against Montedison were raised during the course of the Interference. There is some question therefore of the extent to which they may be raised for the first time in this Court. The question of admissibility of new fraud claims in a § 146 action has already been addressed in the context of this case, both by this Court[677] and bythe Court of Appeals for this Circuit.[678] At an earlier stage of this litigation, plaintiffs petitoned this Court for leave to amend their complaints to included allegations of fraud and inequitable conduct on the partof Montedison. This Court held that the only

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[677] Standard Oil Company of Indiana v. Montedison, S.p.A., 398 F. Supp. 420 (D.Del. 1975).

[678] Standard Oil Company of Indiana v. Montedison, S.P.A., 540 F. 2d 611 (3d Cir. 1976).

litigable issues in a § 146 proceeding were those that had previously been presented to the Board. Since plaintiffs' motions sought to add issues that had not been raised before the Board, the motions were denied. Appeals were taken by plaintiffs from that interlocutory order to the Third Circuit Court of Appeals upon certification by this Court pursuant to the provisions of 28 U.S.C. § 1292(b).

The Court of Appeals, in a decision by Judge Maris, held that the District Court may exercise its discretion to permit issues of fraud and inequitable conduct to be raised for the first time in a § 146 proceeding only if they are related to the factual issues of historical priority, *i.e.* to the "question as to which of the parties involved in the Interference actually first used the device or process of invention".[679] Fraud claims relating to other questions of patentability are inadmissible. Following this decision, this Court delineated the fraud allegations to which the parties might address themselves,[680] and clearly excluded claims related solely to questions of patentability.[681]

The general rule on the sufficiency of pleading fraud claims in a § 146 action is that specific allegation in the complaint is not necessary if the claim was raised below because the parties are on notice that any issues properly presented to the Board may be presented in the District Court.[682] If the claim is raised for the first time on ap-

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[679] 540 F.2d at 617.

[680] Standard Oil Company of Indiana v. Montedison, S.p.A., 431 F.Supp. 1064, 1072 (D.Del. 1977).

[681] "[A]llegation of fraudulent misrepresentations or omissions with respect to the results of comparative tests performed by Montedison are not permissible if the only relevance of those allegations is to establish the unpatentability of the Natta invention over prior art." 431 F.Supp. at 1071.

[682] 398 F.Supp. at 422.

peal, however, it must be pleaded with specificity since "a defendant in a § 146 action is entitled to notice in the complaint, or by amendment to it, of an issue of fraud, which, in the exercise of the court's discretion, has been permitted for the first time to be litigated in that action."[683] Plaintiffs in the instant case properly amended their § 146 complaints to include the fraud allegations against Montedison,[684] and insofar as these claims are relevant to priority, they will be admitted. Du Pont and Montedison, however, did not amend to include allegations against Phillips, so only such of these claims as were raised below will be examined.

Determination of patent law fraud traditionally consists of the examination of two lements, each of which must be proven by clear and convincing evidence.[685] The first element is misrepresentation, which may consists of either an intentional lie[686] or deceitful suppression of relevant information.[687] A party who withholds information does so at its own risk since it is ultimately the duly of the Board, and not of the applicants and their attorneys, to

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[683] 540 F.2d at 618.

[684] Civil Action No. 4319, Pleading Papers No. 176 (Du Pont), No. 182 (Phillips), and No. 197 (Standard).

[685] In re Multidistrict Litigation Involving Frost Patent, 378 F.Supp. 1353 (D.Del. 1975) *aff'd. in relevant part,* 540 F.2d 601 (3d Cir. 1976).

[686] Corning Glass Works v. Anchor Hocking Glass Corp., 253 F.Supp. 461 (D.Del. 1966); Chromalloy American Corp. v. Alloy Surfaces Co., 339 F.Supp. 859 (D.Del. 1972).

[687] In re Multidistrict Litigation Involving Frost Patent, *aff'd. in relevant part,* 540 F.2d 601 (3d Cir. 1976); Beckman Instruments, Inc. v. Chemtronics, Inc., 428 F.2d 555 (5th Cir. 1970); SCM Corp. v. Radio Corporation of America, 318 F.Supp. 433 (S.D.N.Y. 1970); Monsanto Co. v. Rohm & Haas Co., 312 F. Supp. 778 (E.D.Pa. 1970), *aff'd.,* 456 F.2d 592 (3d Cir. 1972).

determine what information is relevant.[688] The second element is materality, which is found where a misrepresentation "makes it impossible for the Patent Office fairly to assess [the patent] application against the prevailing statutory criteria."[689] Report to this relatively low standard rather than one of actual cause and effect is necessitated by the uncertainty inherent in attempting to ascertain precisely the weight and impact carried by each fact placed before an examiner. Where a party is guilty of misreprsentation, it seems only fair that it and not the innocent party should assume the risk of this uncertainty.[690]

Many of the fraud claims against Montedison are based on events that took place during Montedison's prosecution of its application for a separate patent. Some background is therefore necessary to an understanding of the Court's decisions. Montedison filed an application for a patent for "prevailingly isotactic polypropylene" (the " '300 patent"),[691] on December 9, 1957.[692] Prosecution of this application was pursued until suspended by the Examiners on March 25, 1959 pending resolution of this crystalline polypropylene interference proceeding because of the simi-

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[688] *See* Super Products Corp. v. D. P. Way Corp., 400 F. Supp. 998 (E.D. Wis. 1975)

[689] In re Multidistrict Litigation Involving Frost Patent, *supra* note 685, at 604

[690] SCM Corp. v. Radio Corp. of America, 318 F.Supp. 433 (S.D.N.Y. 1970).

[691] "Prevailingly isotactic polypropylene" is a form of the crystalline polypropylene at issue here, notable for its much higher degree of crystallinity

[692] This application, No. 701,332, was a divisional application based on Montedison's June 8, 1955 application No. 514,099 for crystalline polypropylene.

larities between the two products.[693] Montedison subsequently attempted to convince the Examiners to reopen the prosecution by submitting documents and samples concerning the crystalline polypropylene products of the parties to the Interference in an attempt to distinguish the products under dispute in the two actions. Afer prosecution was reopened on November 30, 1961[694] and the '300 patent was eventually awarded to Montedison in 1962,[695] Montedison brought infringement actions based on this patent against various defendants.[696] These actions were ultimately

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[693] The Examiners' communication stated:

> "In view of the similarity of the claims in this application and the count of Interference No. 80,634 which parent application Serial No. 514,099 is a party, prosecution is suspended pending the outcome of that interference. Both the instant claims and the interference count include crystalline polypropylene made in the same manner and it is not seen how the question of patentability of the instant claims can be determined without deciding the propriety of the count, or potential counts, all inter partes matters which cannot be decided *ex parte*.
>
> Applicants should call this case up for action after the Interference count or counts have finally been determined."

'300 File History, p. 189.

[694] *Id.*, p. 293.

[695] The Examiners initially found Montedison's claims for isotactic polypropylene unpatentable over crystalline polypropylene, and denied the application. *Id.* The Board of Patent Appeals reversed and awarded Montedison Patent No. 3,112,300 for prevailingly isotactic polypropylene on May 31, 1963. *Id.*, p. 394.

[696] Montedison sued California Rexall Drug and Chemical Company, Chevron Chemical Company, and Enjay Chemical Co. in the Central District of California, and Humble Oil & Refining Co. in the District of Maryland. Montedison then joined the Avisun Corporation as a defendant in October, 1967. Separate actions were subsequently brought in this Court against Eastman Kodak Company, Phillips, and Diamond Shamrock. Montedison also sued Dart Industries, Inc. and El Paso Products Co. in the Western District of Texas.

transferred to and consolidated in this Court by August 31, 1971.[697] Evidence of Montedison's prior document and sample submissions to the Examiners came to light during discovery in the infringement litigation, and it is this evidence which supports certain fraud claims presently at issue.

PHILLIPS'S FRAUD CLAIMS AGAINST MONTEDISON

Phillips alleges that Montedison perpetrated four fraududent acts; designated by Phillips as Events I-IV.

Events I: DeVarda's Interview.

Phillips's first allegation of fraud centers upon an April 1, 1958 interview between Dr. Giuseppe DeVarda, Montedison's house counsel in charge of patent matters, and several patent examiners.[698] According to Patricia Peake, one of Montedison's patent counsel:

> During the conference on April 1, 1958 in the Patent Office, Mr. Mark Liebman asked Dr. De Varda about the prior art on crystalline polypropylene. He wanted to know from Dr. DeVarda whether anyone had ever produced a crystalline polypropylene prior to Natta even if they did not know they had produced it.
>
> I [Peake] was not sure that Dr. DeVarda understood the question because of English not being his native language and I began to explain it to him. Mr. Liebman interrupted me. He said "I asked him (Dr. DeVarda) the question, Mrs. Peake, and not you, or

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[697] The consolidated suit was denoted Civil Action No. 3343. All claims were eventually settled and dismissed without prejudice by 1975.

[698] This meeting was attended by Guillio Natta, Montedison's inventor, and Patricia Q. Peake, one of Montedison's patent counsel. *See* P-639.

> are you afraid he will say something you don't want him to say?
>
> He then repeated the question to Dr. DeVarda.[699]

DeVarda described his response:

> If I remember it rightly, I managed not to give a straight yes or no answer to said question. I think I proposed another question: "What does it mean 'prior to Natta' "? There was not anything published at the time of Natta's invention. As far as pending applications are concerned it depends how far back people may go.[700]

Phillips alleges that DeVarda suppressed his knowledge that Phillips had produced crystalline polypropylene prior to Natta. Phillips further alleges that this suppression was material since the provision of accurate information might have resulted in a termination of the Interference in favor of Phillips. The Court finds that Phillips's charges are true. Moreover, the Court finds that Toulmin and Peake, who were both present at the interview, also committed fraud by suppressing their knowledge that DeVarda's statement was a misrepresentation.

The initial determination that must be made is whether this fraud claim is admissible under the standards promulgated by Judge Maris. Since Montedison's alleged failure to supply accurate information to the Examiners concerning the results of subsequent reproductions of the process disclosed in a constructive reduction to practice is relevant to the determination of whether the application disclosed the product, the required nexus between the fraud claim and Phillips's historical date of priority is established.

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[699] P-638.

[700] P-637.

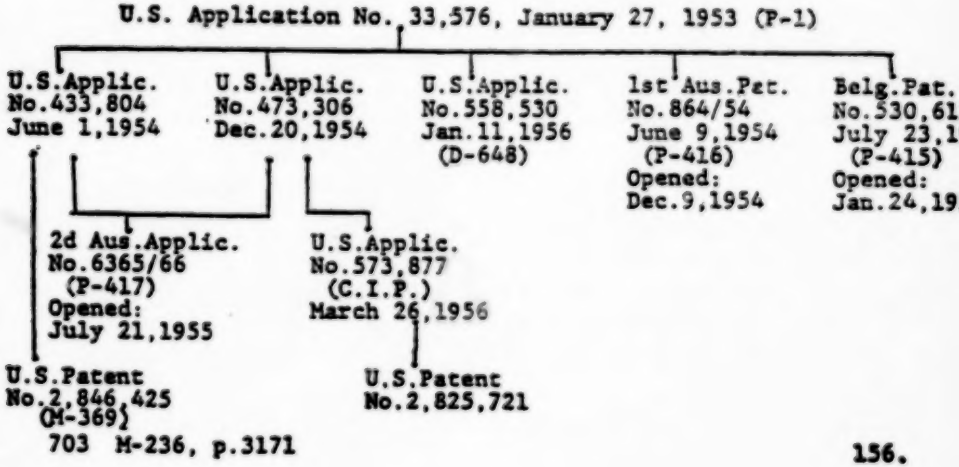
Appendix B

The second question for determination is whether Montedison had knowledge which if suppressed would have constituted a misrepresentation. It is clear to the Court that Montedison knew at the time of the Examiner's question that a process for the production of crystalline polypropylene had been disclosed prior to Natta, and that this information was suppressed. This knowledge was based on experiments performed by Montedison's Dr. Carlo Capucci[701] during 1955 following information that had been disclosed by Phillips 1953 American application. Montedison first learned of the possible priority of Phillips in 1955, after Phillips Belgian patent and an Australian patent application for the same inventions had become open for public inspection.[702] Shortly after Montedison obtained these documents, Capucci began attempting to reproduce Phillips's work in order to determine whether Natta's priority date was threatened.[703]

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[701] *See* text accompanying notes 463-521, *supra.*

[702] P-533; The interrelationships between Phillips's various applications and patents is summarized in thefollowingtable:



[703] M-236, p.3171

Appendix B

Montedison contends that Capucci did not produce a solid crystalline polypropylene but rather a copolymer containing ethylene and propylene. This argument is based on Mazzanti's 1974 deposition testimony that Capucci's product was soluble in hydrocarbon liquids at room temperature. Since solid crystalline polypropylene is usually insoluble under those conditions while copolymers are generally dissolved quite readily, Mazzanti concluded that Capucci's product was a copolymer.[704] Although Mazzanti thought this hypothesis had been formulated at Montedison in 1955 or 1956,[705] he did not cite a single contemporaneous document as support.

In sharp contrast to Montedison, Phillips introduced extensive evidence that Capucci did produce the product of the Count. The evidence concerning the product itself is set forth *supra,* at text following note 463. In addition, Phillips has submitted contemporaneous documentation to support the argument that Montedison knew that Capucci's spring products were crystalline polypropylene homopolymers. Perhaps the most telling document is a report written by Natta, Montedison's senior polymer chemist, on September 14, 1956, prior to Capucci's autumn 1955 experiments.[706] In this document Natta states that the fact that Capucci had separaed "a crystalline part which however contains a mixture of polythene [polyethylene] and of propylene, . . . makes us consider as highly improbable the copolymerization of the propylene with ethylene which is

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[704] M-1266F, p. 960. Mazzanti conceded the possibility that "there could be some homopolymers having a very, very low crystallinity, bit I think that also in that case they should be insoluble by hydrocarbons at room temperature. So I am more inclined to believe that those were copolymers, as we know that copolymers are much more soluble." *Id.*, p. 961.

[705] *Id.*, pp. 961-62.

[706] P-553.

claimed in the Phillips patent."[707] This observation is particularly significant because "mixture" is a precise chemical term meaning "a substance whose ingredients can be separated by physical means",[708] or "two or more substances which are mixed; but not chemically combined. Mixtures . . . may be separated by mechanical means".[709] The use of the term "mixture" therefore excluded the possibility that Capucci's products were copolymers, since the components of a copolymer may be separated only by chemical means.

Another report lending further support to Phillips's position was prepared by Dr. Arthur Glasebrook, describing a June 1955 interview with Natta.[710] On June 5, 1955 Glasebrook prepared P-488, stating that Montedison had tried out the Phillips process to determine whether it could be used to produce crystalline polypropylene and found that "[t]he answer", according to Natta, "is 'Yes.'"

The argument that Montedison knew that Capucci's spring products met the Count is also supported by several documents indicating that at a July 1955 scientific meeting in Zurich Natta announced his discovery that the Phillips product contained crystalline polypropylene. One of these documents is an October 26, 1954 letter to Montedison in which Peake wrote:

> [W]e referred in our preliminary statement for Natta et al., to Professor Natta's public announcements on

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[707] *Id.*, pp. 10-11.

[708] Concise Chemical and Technical Dictionary (2d Ed. 1962), p. 628.

[709] Hackh's, *supra* note 30 at p. 542.

[710] P-488. Glasebrook was employed by the Hercules Powder Company, a large American chemical company originally involved in this Interference, to gather and report information concerning the research of foreign scientists. Pleading Paper No. 720, pp. 499-506.

> July 22 and 23, 1955, at Zurich, and during which he referred to having obtained (using his techniques) a "petite" amount of isotactic polypropylene (as defined by us) from a crude prepared by him using Hogan et al. [i.e., Phillips] catalysts.[711]

Another is a letter written on March 14, 1958, and sent to Montedison by Toulmin and Toulmin. The letter states:

> At the Zurich meeting of July, 1955, Professor Natta announced that his group had isolated a small amount (some percent units) of crystalline polymers *from the crude polymerizate of the Phillips' process.* (emphasis in original).[712]

In light of this evidence, the Court finds that Montedison was aware that Capucci's initial work had produced crystalline polypropylene by following the Phillips Belgium patent and its first Australian patent application. In mid-September, 1955 Montedison learned of additional Phillips filings corresponding to the second Australian application that had been opened for public inspection on July 21, 1955. On September 20, 1955, Capucci began his autumn 1955 experiments in order to determine further whether the products claimed by Phillips posed a threat to Montedison's priority position.[713] Montedison claimed that Capucci followed Phillips second Australian application.[714] The importance of Montedison's claim is that a part of this application carried a priority date of December 20, 1954 which, rather than being "prior to Natta",

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[711] P-530, p. 11607.

[712] P-629, p. 3.

[713] P-756; M-1274, p. 3227.

[714] *See* note 702, *supra*.

is nearly six months after Natta's date of June 8, 1954. Montedison argues that Liebman's question did not concern art that had developed after Natta's priority date and that therefore DeVarda committed no fraud by failing to mention Capucci's autumn experiments.

Montedison buttresses its argument by pointing to what it considers to be essential differences between the second Australian application and its predecessor documents. Phillips contends that the differences were minor and that the Capucci autumn runs were essentially based on information that had been disclosed earlier. The first difference identified by Montedison concerns the need for excluding water vapor from the presence of the catalyst during activation and in subsequent handling. Montedison correctly asserts[715] that the second Australian application cautions that "water [and] oxygen . . . act as poisons for the catalysts of this invention".[716] This caution, however, was not new, but was at least implicitly included in Phillips 1953 application.[717]

Montedison refers next to varying teachings regarding the addition of strontium to the catalyst support in an effort to buttress its claim that Capucci's autumn experiments followed the teachings of Phillips second Australian application, rather than its 1953 American application. While Phillips January 27, 1953 disclosure failed to mention strontum, Montedison correctly states that Phillips second Australian application taught that strontium should be added.[718] Montedison failed to prove, however, that the addition of strontium materially affected propylene pro-

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[715] Montedison's Findings of Fact, *supra* note 216, at No. 804.
[716] P-417, p. 69.

[717] *See* text following note 651, *supra*.

[718] Montedison's Findings of Fact, *supra* note 216, at No. 856.

duction.[719] If Montedison could prove that the addition of strontium was material to proplylene production DeVarda's failure to mention Capucci's autumn experiments would still not be justified. Although Montedison first learned of the addition of strontium from Phillips second Australian application, the technique was actually first disclosed in an American patent application filed by Phillips on June 1, 1954,[720] which was clearly "prior to Natta". The resulting products were therefore within the scope of Liebman's question.

In a final effort to support its claim that Capucci's autumn work followed methods disclosed only after Natta, Montedison refers to precautions against exposing the catalyst to oxygen. Montedison claims that Capucci's autumn experiments followed alleged disclosures in the second Australian application that the activated or regenerated catalyst should be cooled and stored in an atmosphere of nitrogen rather than in the oxygen atmosphere used for activation or regeneration.[721] Similar teachings were included in Phillips 1953 application. Montedison's argument, however, misinterprets the second Australian application. Although the application states the oxygen can poison the catalyst, this threat is neither constant nor is it described as such. Phillips second Australian application explicitly mentions only one period —during polymerization—when oxygen must be removed from the presence of the catalyst.[722] The Court therefore

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[719] *See* text accompanying notes 663, 664, *supra.*

[720] U. S. Patent Application No. 433,804. *See* note 702, *supra.* It may be argued that DeVarda was unaware of this application. Phillips second Australian application, however, of which DeVarda was aware, clearly listed June 1, 1954 as the priority date for a variety of claims based upon strontium addition. *See* P-417.

[721] Montedison's Findings of Fact, *supra* note 216, at No. 807.

[722] P-417, pp. 69-70.

finds that Capucci's autumn experiments followed Phillips 1953 disclosure and that Capucci merely added an undisclosed unnecessary step.

Indeed Capucci at least partially attributes his autumn work to Phillips Belgian patent,[723] which was based on Phillips's 1953 American disclosures. In his summary report on the fall experiments, Capucci wrote:

> [We have] heard that Phillips Co. had filed a patent (2) claiming the production of alpha-olefin high polymers by the use of catalyst consisting of chromium oxides supported on porous oxides of silica, alumina, dioxide, etc. . . . [W]e have thought it convenient to reproduce the runs shown in the examples of Phillips' patent, in order to establish whether, from the obtained crude polymers, fractions could be isolated having properties and structures analogous or equal to the ones shown by isotactic polymers. . . . We have therefore reproducted the runs described in Phillips' patents. (2) Belgium Pat. 530,617 and Australian Pat. Application 6365/54.[724]

Several additional documents not expressly identified with either Capucci's spring or fall experiments also indicate that Montedison believed prior to the date of DeVarda's interview that Phillips's 1953 application disclosed the production of crystalline polypropylene. One

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[723] *See supra* note 702.

[724] P-756. Montedison claims that Capucci erroneously footnoted the Belgium patent, while properly citing the second Australian application. Montedison's Findings of Fact, *supra* note 216, at No. 857. Once again, however, Montedison provides only weak support, relying upon Mazzanti's very recent reconstruction. M-1266F, pp. 875, 936. On the other hand, Capucci testified that his notation was accurate. M-1274, p. 3303.

such document is a letter from Toulmin to Montedison dated March 14, 1958 which states that by January 1, 1955:

> Phillips already had pending their U.S. applications Ser.No. 333,576 filed January 27, 1953, and Ser.No. 476,306 filed December 20, 1954. Those applications showed the pentane extraction and the extraction of the pentane residue with MIBK, *but said nothing at all about crystallinity, isotactic structure,* or any structure. Phillips did not *know* what they had. (emphasis in original).[725]

Discussing the possible attacks upon Phillips, Toulmin failed to suggest that Phillips's product was anything other than a crystalline polymer or that Montedison produced it following disclosures that came after Natta.

Another document is Pirani's response dated March 27, 1958, still four days before the DeVarda interview. This letter also attributed the production of a solid crystalline polypropylene homopolymer to Phillips's earliest application:

> [W]e have come to the conclusion that Phillips may be in a position to assert that the *solid polypropylene* which they have disclosed in their early application . . . is a polymer corresponding to what, according to the Natta nomenclature, is called of "predominantly isotactic structure".
>
> The analysis of this residue, as was done in Prof. Natta's laboratory, and illustrated to you in Milan last year, leads in fact to the conclusion that it corresponds approximately to a mixture [containing] . . . 20% of an highly isotactic polymer nonextractable with boiling n-heptane. (emphasis in original).[726]

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[725] P-629, p. 3.

[726] P-631.

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A third document is a September 10, 1957 letter to Toulmin from DeVarda and Pirani which admitted that Phillips's January 27, 1953 application disclosed "solid polypropylene" containing "small amount (20%) of isotactic macromolecules" and which faulted Phillips for failing to recognize what it had.[727] In discussing other possible attacks, the letter failed to suggest that Phillips's product was only a copolymer or that it was obained by following disclosures hat were not prior to Natta's.

In October, 1955 DeVarda and Pirani expanded their thought in a fourth document, a letter to Toulmin.[728] When Phillips filed its 1953 application, DeVarda and Pirani argued that its inventors did not notice that the solid product was a mixture of polymers, that it was characterized by a considerable percentage of isotactic structure, and that it contained substantial crystallinity. Although De Varda and Pirani were concerned wih possible attacks upon Phillips's product, the letter never suggested that these polymers were ethylene-propylene copolymers.

In October, 1955 Mazzanti prepared a fifth document, a chart summarizing the properties of the various polymers involved in this Interference, in which the Phillips 1953 application was again credited with disclosing crystalline polypropylene products.[729] Two memoranda recording Montedison's strategy discussions also strongly evidence Montedison's belief that Phillips 1953 application disclosed the production of crystalline polypropylene. One memo records a May 16, 1956 conference between Toulmin and DeVarda, where the discussion included the properties of the polypropylene obtained with the first Australian Phillips method and Natta reported that a portion of this

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[727] P-907.

[728] P-644.

[729] M-1266F, p. 929.

product was composed of "mixtures of isotactic and block polymers".[730] No one suggested the possibility that this isotactic product might contain ethylene, although other possible attacks upon Phillips were extensively discussed. Nor did anyone suggest that this product was obtained by following the second Australian application which was also discussed at length.

A May 3, 1957 strategy conference attended by Toulmin, Peake, Natta, DeVarda, and Pino was also reported.[731] During this session the earliest Phillips product was again reported to contain "block polymers" and was discussed in terms of head-to-tail enchainment. Although the conferees spent a great deal of effort trying to distinguish Phillips's product from those of Natta, no one suggested that Phillips's product might be contrasted on the basis of an ethylene content. In fact, DeVarda specifically referred to the "Phillips' polypropylene".

Montedison's personnel thus prepared a large number of documents attributing the production of crystalline polypropylene to Phillips's earliest application. Montedison has attempted to dismiss these documents as mistaken. It charges that Toulmin was in error concerning the priority date of the second Australian application and that he therefore incorrectly assumed that all of Phillips's applications had been filed prior to Natta. This explanation is rejected. Any confusion Toulmin might have had concerning the priority date assigned to the second Australian application was at best shortlived. As early as October 28, 1955 Montedison accurately informed Toulmin:

> [W]e are informing you that the Phillips Australian Patent Application No. 6365/55 are [sic] open to pub-

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[730] P-599, p. M9383.

[731] P-602.

> lic inspection on July 21, 1955; the convention dates are June 1 and December 20, 1954.
>
> As you know Phillips have [sic] an earlier application in Australia, 864/54 of June 6 ,1954, which corresponds to Belgian Patent 530,617 of July 7, 1954 . . .[732]

The Court therefore finds that as of the April 1, 1958 interview between DeVarda and the Examiners, DeVarda believed that Phillips had produced crystalline polypropylene prior to Natta.[733]

Montedison argues that the Court should not find that DeVarda's failure to answer the question in these circumstances constituted an intentional misrepresentation for three reasons, all of which must be rejected. Montedison first contends that DeVarda did not understand the question because he asked for supplementary information and that he subsequently lacked the opportunity for further comment.[734] The weaknesses of this argument is that the information sought by Examiner Liebman remained relevant and material for more than four years after the April 1, 1958 interview.[735] It stretches credulity to believe that Montedison could find no opportunity to supply the requested answer to the Examiner's question during this period when it prepared and submitted more than one hundred documents comprising several thousand pages of other information to the Examiner.

Montedison next argues that DeVarda's silence was proper. This argument construes the Examiner's question as an inquiry only as to what Phillips's own data revealed. Montedison contends that since DeVarda had no knowl-

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[732] P-859, P-727. *See* text accompanying note 702, *supra*.

[733] P-602, P-631, P-644, P-921.

[734] Montedison's Findings of Fact, *supra* note 216, at No. 891.

[735] *See* text accompanying note 9, *infra*.

edge of Hogan's and Banks's data except as discussed by their application, it was proper for him to say nothing.[736] The weakness of this argument is that it too narrowly construes the Examiner's question which asked "whether anyone had ever produced a crystalline polypropylene prior to Natta even if they did not know they had produced it." The question as stated did not limit DeVarda's attention solely to each experimenter's data but rather asked him to consider all relevant information. Among such information Capucci's repetition experiment results, which should have been mentioned to the Examiners.

Finally, Montedison argues that DeVarda was excused from answering the Examiner's question since to do so would have been "misleading".[737] Indeed, DeVarda has twice attempted to explain and justify his fraud in this manner. In recounting his October interview to Toulmin, DeVarda wrote:

> Perhaps things would have not changed by admitting a possible priority of Phillips . . . in discovering normally solid crude polypropylene mixtures, which after our discovery of isotactic polypropylene turned out to be partially crystalline. At least in the Phillips case this seems most likely to have really happened.
>
> However in April 1958 the situation did not seem sufficiently ripe, for making this admission to four prejudiced Examiners who did not seem to be particularly anxious, at least then, to have available and at their disposal all the relevant and complex information on the issue. . . . [I]t was hardly the right time to enter into too many details on said particularly "hot" topics, in the presence of four not very sym-

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[736] Montedison's Findings of Fact, *supra* note 216, at Nos. 892, 893.

[737] Montedison's Findings of Fact, *supra* note 216, at No. 891.

pathetic Examiners who were *listening probably for the first time to our story* of the Natta's discoveries as resulted from the first complete analysis which we were able to perform during the first months of 1958. . . .

I recall that the examiners were showing unwillingness to enter, not only into any detail, but also into discussion whatsoever on the relevant and complex information I had just broadly outlined to them, since, according to the Examiners, there would have been ample time to do this properly, once the interference had been declared.

Since you are asking my views on the matter, I will frankly reply that what seems most urgent and important to us in the direct education, preferably by direct action (interviews, amendments, letters), of all those who in the Patent Office may in whatever capacity have to do with our cases. (emphasis in original).[738]

DeVarda again reiterated his feelings in a 1973 deposition:

[C]rystallinity was a peculiar parameter to rely upon and . . . what I really desired was to give the Examiner a full and complete disclosure and picture of the situation without withholding anything at all. But I had . . . already tried several times to do so; but I recall that the Examiner says the letter was showing unwillingness to enter not only into any detail, but also into discussion whatsoever on the relevant and complex information I had just broadly outlined to them. . . . [T]he Examiners were not willing to listen to my explanation in order to get the full grasp of the situation.[739]

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[738] P-637, p. 2.

[739] M-1265B, p. 324.

DeVarda apparently thought that, considered alone, the results of Capucci's experiment would present an unfair and incomplete picture. Such considerations, however, do not excuse the failure to supply material information. It is the province of a patent examiner, and not a party, to determine what data is relevant and to elicit it from the parties. When requested to do so, the parties must supply available information. Although a party may subsequently attack such information as unfair or irrelevant, it cannot attempt to perform the examiner's function by determining the validity of its own case.[740] To the extent DeVarda sought to do so, his actions cannot be excused.

Further, if DeVarda's actions were somehow excusable, those of Peake and Toulmin were not. Peake and Toulmin both recognized that the Patent Office might award priority to Phillips should it be discovered that its polypropylene was the least bit crystalline.[741] Having participated in Montedison's strategy discussions,[742] Peake and Toulmin were well aware that Phillips product was crystalline polypropylene. They were also aware, from reading DeVarda's account of his interview,[743] that he had withheld information from the Examiners. Peake and Toulmin nevertheless remained silent, despite numerous opportunities to correct the impression which DeVarda left with the Examiners.

The Court therefore finds that by failing to inform the Patent Office that Phillips had disclosed a homopolymer of crystalline polypropylene prior to Natta, Montedison engaged in an intentional suppression of reelvant information that constitutes a misrepresentation.

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[740] *See* text accompanying note 688, *supra.*

[741] *See* text accompanying notes 747-53, *infra.*

[742] See text accompanying notes 730, 731, *supra.*

[743] P-637.

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It remains to be established that Montedison's misrepresentation was material to the Examiners' decision. The Court finds that the misrepresentation was material because it might have affected the Examiners' ability to properly decide two motions made by Phillips which could have affected its date of priority.[744] The first motion was to dissolve the Interference and grant Philips priority, and the second was to make Phillips the senior party.[745] Both motions were based on Phillips's claimed 1953 constructive reduction to practice. The rationale advanced by the Examiner Liebman for denying these motions was that there was insufficient proof that the product disclosed by Phillips's 1953 application was in fact the product of the Count:

> [Phillips 1953 application] does not give a method for preparing the solid polymer fraction in question which corresponds to a disclosed method for preparing a polypropylene disclosed to fall within the scope of the count. . . . [T]here is no actual duplication [of this application] wherein a crystalline polypropylene component is identified. . . . [T]here is a reasonable doubt that [Phillips's] solid polymer . . . was in fact a solid polypropylene containing a substantial crystalline polypropylene content.[746]

Had Montedison supplied the information that it had in fact produced solid crystalline polypropylene by duplicating the process disclosed in Phillips 1953 application, the

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[744] Interference Record Paper No. 32, pp. 68, 73, 74.

[745] The senior position in an Interference is advantageous because the burden of proof is on the challenging parties to prove that the senior party is not entitled to the patent. Rosenberg, *supra* note 463, pp. 143-44.

[746] Interference Record Paper No. 132 at p. 1050.

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Examiners might well have decided the motions differently and either dissolved the Interference or directly awarded Phillips the senior party status it requested. The possible effects of Montedison's suppression upon the outcome of Phillips's two motions is not mere speculation. Strategy discussions among Toulmin, Peake, and Montedison officials demonstrate the importance attached by the Examiners to information relevant to whether Phillips's 1953 products were crystalline. On several occasions between 1957 and 1962, the Examiners indicated to Toulmin, Peake, and DeVarda that they would strongly favor the first party who had produced any amount of crystalline polypropylene.

Toulmin first learned in 1957 about the Examiners possible preference for the first party who produced crystalline polypropylene. About November 8 of that year the Patent Office proposed as the Interference Count "normally solid polypropylene having a crystalline polypropylene component." This wording worried Toulmin who was afraid that the Patent Office "might take the attitude that the *extent of crystallinity* is a *matter of degree.* It would then follow that they would be prepared to hold that whoever had *any* amount of crystalline polypropylene first, would be the *first inventor.*" (Emphasis in original).[747] The need thus arose to distinguish the Phillips product which, though crystalline, was less so than Natta's. Toulmin confirmed this fear during a November 26, 1957 interview in which he learned that "the [Patent] Office is disposed to take just the position" outlined above.[748] "The *fundamentally new thing* to them," Toulmin later reported, "is a polypropylene having a *crystalline content,* any amount." (Emphasis in original).[749]

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[747] P-865, p. 9308.

[748] *Id.*

[749] P-921, p. 9449.

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The Examiners reiterated their opinion at DeVarda's April 1, 1958 interview. Peake reported that Examiner Liebman[750] stated:

> [I]f a reference (having 1% crystallinity) were found, no interference would be set up on the present count. . . . The Examiners whom we interviwed will not make the decision according priority in the interference but the Examiner's insistence that he would use a reference showing a polypropylene of even 1% crystallinity (whether the crystallinity had been recognized or was only discovered later) against the proposed count may be some indication of present Patent Office thinking.[751]

The materiality of DeVarda's suppression is further attested to by Peake's report of a July 1962 interview with Examiner Schofer, who had assisted Ljebman in deciding Phillips's motions:

> [Schofer] has objective criteria for finding invention. He is convinced that the broad invention in polypropylene is the discovery of crystallinity in it. No one has ever shown him that there was even a trace of crystallinity in any polypropylene that would be prior art to the parties to [this interference], and he knows that when the Examiners asked Dr. deVarda and Prof Natta for such a prior art reference, in February 1958,[752] they did not direct the Examiners to any such reference.[753]

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[750] P-638.

[751] P-639.

[752] Peake probably meant April, 1958.

[753] P-692, p. M12705.

Montedison still claims, in the face of all this evidence, that its fraud was not material. Montedison argues that the Examiners learned from seven of Natta's publications that crystalline polypropylene could be produced by following Phillips earliest application.[754] The Court has examined these articles and does not find that they would have supplied the Examiners with sufficient information to render Montedison's suppression immaterial.[755] Assum-

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[754] Montedison's Findings of Fact, *supra* note 216, at Nos. 894-896.

[755] On June 7, 1955, for example, Natta reported in the Proceedings of the Fourth World Petroleum Congress:

> "Our research on the production of propylene polymers with the aid of catalysts described in [Phillips first Australian patent], have up to now only resulted in low yields of almost completely amorphous polymers, having irregular structures. Only when employing technical propylene, which contains some percent units of ethylene, the mixture of polymers obtained has small amounts of a solid crystalline product that, as revealed by X-ray examination, consists of polyethylene." P-535(a).

Of similar import is the August 1955 issue of Angewandte Chemie, which reported that Natta had disclosed:

> "If one wants to polymerize higher olefins [than ethylene] to regularly built, crystalline macromolecules, one cannot in practice employ the catalysts mentioned in [the Phillips] patent." P-535(b).

In the October-November, 1955 issue of Die Makromolekulare Chemie, Natta wrote:

> "We have even isolated small quantities of isotactic polymers of low molecular weight, by fractionating polymers of propylene prepared by using catalysts made up of metal oxides." P-535(c).

This article failed to disclose, however, that these catalysts had been the subject by Phillips earliest application. A similar failing

(footnote continued on following page)

(footnote continued from preceding page)

characterizes the October, 1955, disclosure in La Chimica E L'Industria, where Natta wrote:

> "Subsequently, we have prepared the isotactical polymers of alpha-olefins with a type of catalysts other than that used by Ziegler. We have isolated small quantities of high-molecular-weight isotactical polymers by the fractionation of propylene polymers, which had been prepared with certain catalysts made of the oxides of polyvalent metals, and not with metallo-organic reagents." P-535(d).

In the November, 1955 issue of La Chimica E L'Industria, Natta wrote:

> "Finally, as we have previously communicated, we have noticed the presence of small amounts of crystalline polypropylene with a molecular weight below 20,000 and mixed with considerable quantities of amorphous polypropylene in the propylene polymers prepared with the aid of catalysts containing suported hexavalent chromium. Such catalysts have been previously sugested for the polymerization of poly-alpha-olefins." P-535(e).

For this last proposition, Natta cited the Australian patent application No. 6367/55, P-535(e). Even assuming that the Examiners understood that Natta intended to cite Phillips second Australian application No. 6365/55, P-417, the article failed to direct the readers' attention to Phillips earlest patent applipation. Similarly, Natta's February, 1956 La Chimica E L'Industria article (P-535(f)), failed to mention Phillips first Australian application, although it did claim that 1-2% isotactic polymer had been made by following Australian patent application No. 6367/55.

In the September, 1956 issue of La Chimica E L'Industria, Natta wrote:

> "We too have demonstrated that very small amounts of solid polymers present in those obtained with the aid of Phillips catalysts[34] exhibit a certain crystallinity . . .
>
> [34] Australian patent 864/54 and Belgium patent 530,617." P-535(g).

Although the article does mention that crystalline polypropylene can be produced by following two of Phillips patents, it fais to indicate that the priority of these patents is proper to Natta.

ing that the Examiners might have gleaned some useful information from these articles, Montedison has failed to prove that the Examiners ever saw them. The only evidence of Board review offered was that in early 1960 Montedison placed copies of these articles in the Patent Office Library.[756] Based on the proximity of the articles, Montedison attempts to infer that the Examiners carefully studied them and absorbed their contents.[757] The Court doubts, however, that the Patent Examiners took the time to study these articles, six of which were written in either French or German,[758] with insufficient detail to understand that Phillips produced crystalline polypropylene prior to Natta. These doubts are confirmed by Peake's observations, quoted above, that Examiner Schofer did not know that Phillips earliest patent application disclosed crystalline polypropylene.

In sum, the Court finds that Montedison committed fraud against Phillips by virtue of DeVarda's, Toulmin's, and Peake's failure to inform the Examiners of Phillips's pre-Natta reference to crystalline polypropylene.

Events II and III: Toulmin's Affidavit and Peake's Sample Submission.

Phillips also asks this Court to find that two of Montedison's other actions, designated by Phillips as Events II

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[756] M-921; M-922; M-923.

[757] Montedison claims that in working on the Zletz Interference application, Examiner Schofer examined these "very Natta publications". Montedison's Findings of Fact, *supra* note 216, at No. 895. In fact, Examiner Schofer cited only two articles, neither one of which is presently relied upon by Montedison. Moreover, Schofer understood the cited articles as teaching something entirely different from what Montedison now contends. Where Montedison claims that Natta's publications revealed that Montedison's polymers could be made using the Phillips catalysts, Schofer cited these articles for the proposition that "polymers prepared by different processes are in fact different." M-1137, pp. 44-46.

[758] *Cf.*, M-924, p. 3 and P-535.

and III, were fraudulent. In Event II Toulmin submitted an affidavit [759] to the Patent Office which was allegedly misleading and fraudulent in that it described only the unfavorable characteristics of Phillips earliest product without revealing the favorable information that the product was crystalline polypropylene.[760] Similarly, in Event III Peake displayed samples of the Phillips 1953 product to the Examiners,[761] which Phillips alleges was misleading and fraudulent in that Peake thoroughly discussed the bad characteristics of Phillips 1953 product without revealing that it was crystalline polypropylene.[762] Although these claims are admissible because they are relevant to the determination of the date of Phillips's constructive reduction to practice, the Court rejects Phillips's contentions because it has proven neither that the actions of Toulmin and

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[759] P-547.

[760] Phillips also claims that Montedison misrepresented other relevant data to the Examiners claiming (1) that it had followed precisely Phillips 1953 application when in fact strontium had been added to the catalyst, and (2) that it had measured certain data including density of the product when it had not done so. Phillips's Brief, *supra* note 131, at 724. Since Phillips has failed to show any injury from these allegedly fraudulent acts, and in fact was apparently benefited by them, this Court finds that the claims are without merit.

[761] P-587. *See* also P-675; M-1263J, pp. 624-38.

[762] Phillips' Brief, *supra* note 131, at pp. 304, 315. Phillips also appears to invent a theory best decribed as fraud *per se*. Under which the Court is asked to find that Peake committed fraud during her interview because she violated a Patent Office rule in failing to report what was said at that interview. *Id.*, p. 304. In support of its theory, Phillips cites two cases: La Maur, Inc. v. DeMert & Doughtery, Inc., 265 F.Supp. 961 (N.D. Ill. 1965); and Corning Glass Works v. Anchor Hocking Glass Corp., 253 F.Supp. 461 (D.Del. 1966). Neither case, however, indicates more than that the failure to record properly Patent Office interviews *may* indicate fradulent activities. This Court has factored this consideration into its findings.

Peake were deceitful in this respect nor that they were material to this Interference action. Since Toulmin's and Peake's actions were made in prosecution of an entirely separate patent application, the '300 application for isotactic polypropylene,[763] the Court is skeptical about finding that Montedison committed fraud in the present action.

In seeking to overcome this skepticism and thereby to prove fraud by clear and convincing evidence, Philips argues that Montedison expressly applied for a patent upon isotactic polypropylene in order to use that prosecution to make *ex parte* attacks upon Phillips's product in this Interference.[764] In support of this proposition, Phillips relies upon four arguably relevant documents.[765] The first is an October 23, 1959 letter from Pirani to Montedison's Piero Giustiniani stating that it was beneficial for Montedison to submit a petition in the istactic polypropylene prosecution because:

> [I]t allowed us (since, according to the rules ,it was no longer possible to do so directly in the . . . Interference) to present to the Patent Office in a detailed and documented attachment, what were in our view the limits of the 'invention' of our opponents in the 'interference' providing thereby a considerable contribution to the clarification of the problems relative to the 'interference' itself and this was our main objective in presenting it.[766]

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[763] *See* text accompanyng note 691, *supra.*

[764] Phillips' Proposed Findings of Fact and Conclusions of Law, Part II, Fraud Issues, No. 98.

[765] Phillips also attempts to rely on P-673. *Id.* After careful review, however, this Court fails to see how this document is relevant to this issue.

[766] P-891.

This document does not in itself imply, however, that Montedison was not honestly and diligently prosecuting its patent application for isotactic polypropylene. Montedison was entitled to prosecute a patent for isotactic polypropylene for its own sake since it was itself a very valuable, if not the most valuable, form of crystalline polypropylene.[767] As part of this strategy, it was necessary to distinguish between isotactic polypropylene and the product at issue in the Interference.[768] Since definition of the isotactic product remained in dispute until June 4, 1962,[769] Toulmin therefore properly focused on the product of each of the parties in order to define "the limits of the 'invention' of our opponents in the 'interference' " and so to distinguish isotactic polypropylene.

In seeking to prove that statements made in the course of the isotactic polypropylene prosecution were misleading and materially affected the crystalline polypropylene interference, Phillips also relies upon a November 29, 1959 letter from Toulmin to Montedison stating:

> We think a second petition should be filed as promptly as possible . . . this being your chance to put

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[767] *See* P-556, pp. 107-10.

[768] Montedison accompanied its patent application with three of Natta's articles identifying and distinguishing isotactic polypropylene. P-556, pp. 1-89. On January 8, 1958 these were followed up wth an affidavit in which Natta distinguished between isotactic polypropylene and the product of the Count. *Id.*, pp. 91-92. Subsequently, Montedison submitted five amendments further refining and distinguishing its claims for isotactic polypropylene. *Id.*, pp. 93-147. When the Patent Examiner suspended further prosecution of the isotactic polyproylene patent on March 25, 1959 pending resolution of this Interference because of the similarity between isotactice polypropylene and the product of this Interference Count, oMntedison redoubled its efforts to distinguish between the two substances. Toulmin accordingly submitted nearly ninety pages of materials, including the affidavit at issue. *Id.*, pp. 190-270.

[769] Interference Record Paper No. 132, p. 1050.

> the analysis of the early opposing disclosures before the Office in . . . this case which is presently ex parte.[770]

Phillips also points to a letter from Toulmin to Montedison, dated January 26, 1960, which states:

> [The isotactic polypropylene prosecution] has served the purpose of letting us go in *ex parte* with those samples prior to any hearing on motions, something which could never be done if we did not have the *ex parte* [prosecution] pending.[771]

Neither of these documents indicates, however, that Toulmin's affidavit or Peake's sample submission in the isotactic polypropylene prosecution constituted a misrepresentation in the crystalline polypropylene Interference. Neither do they establish the materiality of these events to the Examiners' decision.

Finally, Phillips relies upon a letter from Peake to Montedison written on April 29, 1960:

> The samples, so far, have been presented and considered, for record purposes, only in connection with [the isotactic polypropylene prosecution]. The Examiners said while the samples are revealing, they cannot accept them as finally determinative in the *inter partes* proceeding [the Interference] without letting the other parties comment on them also. They were entertained in [the isotactic polypropylene prosecution] and had the effect of getting acknowledgement of the patentability of the [isotactic polypropylene]

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[770] P-666, p. 35790.

[771] P-579.

claims over the present count of the product interference.

We do not doubt the samples are having their effect on consideration of the *inter partes* [interference] issues in the Patent Office, but for the record they are presented and considered at this point only in relation to the [isotactic polypropylene prosecution], and because [this patent] is not in interference but is rejected on interference matters."[772]

This document does indicate that Peake viewed this Interference and the '300 prosecution as so closely intertwined that statements made in one could influence the other. In fact, however, the Examiners recognized the difference in procedures between the two actions and refused to discuss samples in the '300 action until they were officially submitted in the Interference.[773] Since Phillips has failed

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[772] P-675, p. 11221.

[773] As early as 1953 the Manual of Patent Examining Procedure (MPEP) began with the warning:

> "§ 1111.01 Interviews—Where an interference is declared all questions involved therein are to be determined *inter partes*. This includes not only the question of priority of invention but all questions relative to the right of each of the parties to make the claims in issue or any claim suggested to be added to the ssue and the question of the patentability of the claims.
>
> The Examiners are admonished that *inter partes* questions should not be discussed *ex parte* with any of interested parties and that they should so inform applicants or their attorneys if any attempt is made to discuss *ex parte* these *inter partes* questions. (Notice of March 2, 1935)." M-839.

Later MPEP editions included similar warnings. Toulmin also stated in P-675:

> "What we get out of it all is a resolve by the Patent Office to hold everybody up on any product claim for a polypropylene until all parties are heard by motion to avoid the final action by the Office being criticized as having been taken without giving each party its 'day in court'."

to cite any specific instances in which the Examiners failed to keep submissions separated, this Court is reluctant to believe that the Examiners did not do so.

Event IV: Montedison's Document Production.

Finally, Phillips asks the Court to find fraud in Montedison's delayed production of documents first requested by Phillips in 1966[774] relevant to reporting Capucci's experiments and Montedision's efforts to suppress his results.[775] Phillips argues that it could have used these documents for rebutting claims that its 1953 application failed to disclose the product of the Interference Count.[776] The Court finds that this argument is admissible because documents concerning Capucci's experiments could have affected Phillips historical date of priority by virtue of their relevance to the Board's determination of Phillips's constructive reduction to practice date.

Phillips's argument regarding Event IV is rejected because Phillips has not shown that Montedison's failure to

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[774] P-542. Among Phillips' requests were:

> "All documents relating to the duplications or attempted duplication of any run on propylene polymerization described in Hogan and Banks' application Serial No. 333,576, filed January 27, 1953, in any United States patent issued thereon or foreign patent corresponding thereto, including without limitation . . . Australian Patent 864154, and United States Patent 2,852,721." *Id.*, p. 4.

[775] Phillips claims that its request included documents P-578, P-579, P-644, P-645, P-653, P-662, P-675, P-677, P-930, P-592, P-599, P-629, P-631, P-929, P-655 and P-576, none of which were produced by Montedison. It is difficult, however, to see how Phillips' request can be interpreted to cover documents P-578, P-579, P-592, P-653, P-663, P-675 and P-677, since these documents generally discuss interference strategy without describing any reproduction efforts or including any data therefrom.

[776] Phillips' Proposed Findings of Fact and Conclusions of Law, Part II, Fraud Issues, Nos. 169-189.

produce the requested documents was misleading. The facts that emerge are that Montedison initially assigned Dr. Georgio Moretti to search some of its files for the requested documents.[777] Moretti failed to discover some of the requested documents but did discover many other possibly relevant documents which he submitted to Montedison's American counsel.[778] Counsel then transmitted to Phillips many of the documents that Moretti had submitted but but removed several documents [779] which Phillips now claims should have been produced.

Phillips has not adduced evidence that Montedison's failure to produce these documents was fraudulent. The Court will not infer facts which Phillips has failed to prove, since there are too many innocent explanations for Montedison's actions, especially in view of the size of this document production: it took Moretti 118 pages just to list succintly the documents he supplied to Montedison's American patent counsel.[780]

Phillips also failed to carry its burden of proving that Montedison's omisssions were material to the Board's Opinion, because an examination of the facts indicates that the Board, which was apparently anxious to bring to a close this long-standing Interference case, refused to spend its time considering data similar to that obtained by Capucci.[781] First, it refused to consider any information

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[777] Moretti, p. 1728. Montedison's American patent counsel also searched through some of the files. *Id.*, p. 1765.

[778] P-541.

[779] *Cf.*, P-541, P-545 and P-546.

[780] *See* P-541.

[781] Montedison contends that its failure to comply with Phillips' document rquest was immaterial because it produced at least some of the requested documents to Du Pont, which permitted Phillips'

(footnote continued on following page)

gathered in what were improperly labelled "*nunc pro tunc* experiments". In particular, the Board refused to consider very similar evidence concerning reproduction work performed by Du Pont's Eleuterio. Since evidence of Capucci's experiments would not have been considered, the Court finds that the failure to produce them was immaterial.

Standard's Fraud Claims Against Montedison

Standard first claims that Montedison performed experiments following the Field-Feller patent[782] and produced a product with a crystalline polypropylene content but in subsequent communications with the Examiners misrepresented or omitted information concerning these results.[783] Specifically, Standard claims that Montedison, in attempting to distinguish Natta's product from those it had pre-

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(footnote continued from preceding page)

attorney to review them, along with many others, for a "couple hours" during one afternoon. Montedison's Brief, *supra* note 65, at p. 116; Milan, pp. 1667-68. Montedison's argument is meritless, however. If Montedison deceitfully failed to supply the Patent Office Examiners with relevant information by violating a duty to so supply Phillips. Montedison's action can be excused only if the Examiners, or at least Phillips, obtained the same information in another way. The fact that Phllips' patent attorney might have spent two hours in the vicinity of such information obviously fails to satsfy this requrement.

[782] The Field-Feller, Patent No. 2,691,647 (S-578), issued October 12, 1954 on an application filed December 6, 1952 and is assigned to Standard Oil Comany of Indiana. The patent discloses processes for the polymerization of ethylene and propylene, and is not relied upon by Standard for priority in the instant proceeding. Tr., pp. 10752-53.

[783] Plaintiff Standard's Post Trial Brief On The Issues Relating To Montedison's Fraud, pp. 26-79 [hereinafter cited as "Standard's Fraud Brief"].

pared following the Field-Feller patent, failed to disclose evidence of crystallinity in the product of its reproduction run designated 40-S, undertaken on July 25, 1956, and omitted to report that the products of its runs designated 58-S and 59-S, alleged reproductions of the Field-Feller process made on October 5 and 6, 1956, were crystalline polypropylene.

Standard does not contend that this alleged fraud affected the Board's determination of its historical date of priority.[784] It only contends that:

> [I]f such withheld information had been disclosed to the Board at Final Hearing, the Board might have made an appropriate recommendation to the Commissioner pursuant to Rule 259 of the Patent Office Rules of Practice and the Commissioner might have directed further proceedings to determine: the patentability of the count to Montedison; Montedison's right to remain in the interference; or the necessity of formulating the count differently.[785]

This Court has previously ruled that the parties' allegations of fraud concerning the results of tests performed by Montedison are not admissible "if the only relevance of those allegations is to establish the unpatentability of the Natta invention over prior art'"[786] Since Standard's claims are raised for the first time in this proceeding for the purpose of establishing the unpatentability of the Natta invention over prior art, and not the date upon which a

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[784] *See* text accompanying note 782, *supra*.

[785] Standard's Fraud Brif, *supra* note 783, at p. 79.

[786] 431 F.Supp. at 1071.

party first reduced that invention to practice, they are inadmissible.[787]

Standard next alleges that between 1959 and 1965 Montedison performed reproduction experiments following the Zletz application, some of which yielded the product of the Count, and yet failed to fully inform the Examiners of these results.[788] Specifically, Standard claims that Montedison produced crystalline polypropylene in reproduction runs conducted during November 1961 and that Mazzanti excluded this information from an affidavit[789] filed with the Patent Office on January 8, 1962. In January and February, 1962 Montedison allegedly again produced crystalline polypropylene in runs designated Gamma-76 and -78 but failed to disclose these results to the Patent Office. Standard further claims that these suppressions enabled Montedison to denigrate the Zletz products and application by comparing them to the Field-Feller patent which Montedison had disparaged by suppressing the information discussed above.[790]

Since Montedison's allegedly bad acts related to the historical date of Zletz's actual reduction to practice, they are admissible. This Court finds, however, that even if true,

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[787] Standard also harges that Montedison's alleged fraud affected the determination of Montedison's priority date. Standard's Fraud Brief, *supra* note 783, at p. 76. Standard argues that if complete disclosure of the Field results had been made, the Examiner might have found that the Count was unpatentable to Montedison and prevented it from participating in the Interference. This effect, however, would only be relevant to the question of patentability to Montedison and not to determination of an historical date of priority which is the sole question allowable there. This claim is therefore also not admissible in the instant proceeding.

[788] Standard's Fraud Brief, *supra* note 783, at pp. 103-48.

[789] S-660.

[790] Standard's Fraud Brief, *supra* note 783, at pp. 76, 103.

Montedison's acts do not constitute fraud. Standard's claim for an actual reduction to practice was rejected because Standard failed to prove production, recognition, and utility for its product.[791] Evidence of subsequent testing of a party's product is admissible to prove that the party obtained a product by a certain date. Standard has not produced, nor has the Court found, however, support for the much broader rule that evidence concerning a product produced by a third party in a reproduction run subsequent to a claimed priority date is admissible to establish recognition on the part of the claiming party of the product or of its utility. The information withheld by Montedison could therefore not have affected the Board's ultimate opinion concerning Standard's actual reduction to practice claim, especially since Standard's case regarding the utility of its products was extremely weak.

Standard also alleges that Montedison's actions might have harmed Standard's constructive reduction to practice claim.[792] Assuming *arguendo* that Montedison misrepresented the facts by failing to inform the Board of positive results of experiments performed following Zletz's disclosures, this Court does not see how this suppression might have affected the Board's Opinion, since the Board ultimately decided this issue in favor of Standard and against Montedison. This allegation is therefore denied.

Finally, Standard alleges that Montedison improperly engaged in a series of actions, involving especially DeVarda's interview,[793] Toulmin's affidavit,[794] and Peake's sample presentation,[795] that were designed to improperly

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[791] *See* text accompanying notes 229, 230, *supra*.

[792] Standard's Fraud Brief, *supra* note 783, at pp. 127-48.

[793] *See* text following note 698, *supra*.

[794] *See* text following note 759, *supra*.

[795] *See* text following note 761, *supra*.

influence the Examiners' decisions on the issues raised in the course of the Interference.[796] Standard claims that such contacts constituted instances of unclean hands which "should cause this Court to disaffirm the award to Montedison. . .[,] to withhold relief from the acting party and to remedy the wrong done other parties, the public institutions, and the public itself".[797]

This Court finds these fraud in the air claims inadmissible because they are not relevant to the question of the historical date of priority of a party but relate instead to the question of Montedison's right to enforce a patent. Even if theese claims are admissible, Standard has not established that Montedison's acts were fraudulent as to Standard. Standard has not established that the various contacts were at all material to the Board's determination of its actual reduction to practice claim. Standard produced no evidence that DeVarda or any of Montedison's other employees knew or suspected that Zletz, whose application was not filled until five months after Natta's date of priority, produced crystalline polypropylene prior to Natta. Finally, Standard did not adduce evidence that the contacts that occurred in the context of Montedison's prosecution of its 2300 patent might have exerted any influence on the Examiners involved in this Interference.

Du Pont's Fraud Claims Against Montedison

Du Pont claims that Montedison misrepresented information concerning Du Pont's products to the Patent Office and that these misrepresentations so influenced the Board that it was unable to assess accurately the utility of Du

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[796] Standard's Fraud Brief, *supra* note 783, at pp. 148-86.

[797] *Id.*, p. 152.

Pont's products.[798] Du Pont's objections stem from Toulmin's affidavit submission and Peake's sample presentation, both of which occurred in the prosecution of the separate '300 patent application.

The Court finds that this claim is admissible because it is sufficiently related to the question of Du Pont's historical priority date. Since Du Pont failed to adduce any evidence showing that these actions should be viewed as misrepresentations in this Interference or that these actions might have influenced the Board, however, this Court finds no fraud.

Du Pont did not establish that Montedison's actions in the '300 prosecution constituted misrepresentations in this Interference, nor did it offer evidence that these actions might have affected the Examiners working on this Interference since the Board found that Du Pont failed to establish *any* of the three elements necessary to an actual reduction to practice: production of the product of the Count, recognition that the product corresponding to the Count, and recognition of a utility for the product.[799] Even if Du Pont's claim that there is a connection between the Examiner's determination and Montedison's alleged misrepresentations regarding utility is true, the application would still have been denied on the basis of the two other deficiencies. There is no possibility, therefore, that Montedison's possible fraud could have affected the Examiners' ultimate decision.

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[798] Du Pont argues: "Montedison attempted to affect and probably succeeded in affecting the outcome of Interference 89,634 by actions taken in its copending divisional application. . . . Montedison [thus] set up a scheme to disparage before the Patent Office officials who Montedison knew would decide the motions, the utility of the Baxter et al. product and at the same time make the products of its own early application appear more attractive than they actually were." Du Pont's Brief, *supra* note 70 ,at p. 108.

[799] *See* text accompanying note 136, *supra*.

Appendix B

MONTEDISON'S AND DU PONT'S FRAUD CLAIMS AGAINST PHILLIPS

Montedison's first fraud claim concerns the 1956 American application[800] which formed the basis for Phillips's invitation to join this Interference. This application was based on information contained in Phillps's first Australian patent application.[801] Montedison claims that Phillips should have informed the Patent Office that the first Australian application had been laid open for public inspection more than one year prior to the filing date of its 1956 application.[802] Montedison claims that had Phillips so informed the Patent Office, Phillips's 1956 application would have been unpatentable over its first Australian application under 35 U.S.C. § 102(b), which provides:

> A person shall be entitled to a patent unless ... (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of the application for patent in the United States.

Phillips would thus have been denied admission to this Interference.

This issue was neither raised before the Board nor pleaded in this proceding. Rather, it arose for the first time, apparently as an afterthought, in Montedison's Brief.[803] Since Montedison failed to plead this claim in

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[800] No. 558,530, filed January 11, 1956; D-648. *See* note 702, *supra.*

[801] *See* note 702, *supra.*

[802] Montedison's Brief, *supra* note 65, at p. 64.

[803] *Id.*

time for Philips to prepare to meet it, it is inadmissible as a fraud claim in this action. Assuming *arguendo* that Montedison's claim is admissible, it is meritless. Montedison asserts that the opening of the Australian patent to public inspection on December 9, 1954 constituted "printed publication" for the purpose of § 102(b). Case law shows, however, that opening an application for public inspection does not itself constitute "printing" for § 102(b).[804] Rather, the application must literally be printed. The mere fact that Phillips's first Australian application was laid open to public inspection does therefore not establish a violation of the statute.

Montedison, joined by Du Pont, also allege that Phillips copied into its 1956 application data published by Natta.[805] Specifically, Montedison faults Phillips's application for using both the term "crystalline" and the idea of relying upon x-ray analysis as proof of crystallinity. Du Pont faults Phillips only for appropriating the term "crystalline". Both parties allege that as a result of these acts, Phillips fraudulently gained entry to this Interference.

If Phillips had read Natta's disclosure, followed it, produced a conforming product for the first time, and then applied for a patent, the Court might well find fraud. Phillips did not however engage in this devious chain of activity, but merely executed Natta's tests on products that it had independently conceived and produced, in order to sharpen the issues before the Examiners.[806] The Court

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[804] Phillips Electronic & Pharmaceutical Industries Corp. v. Thermal & Electronic Industries, Inc., 311 F.Supp. 17, 185 U.S.P.Q. 185 (D. N.J. 1970), *aff'd.*, 450 F.2d 1164 (3d Cir. 1971); In re Tenney, Frank and Knox, 117 U.S.P.Q. 348 (C.C.P.A. 1958); Ex Parte Ha-ler, 103 U.S.P.Q. 332 (Bd.App. 1953).

[805] Montedison's Reply Brief, *supra* note 65, at p. 31; Du Pont's Brief, *supra* note 70, at p. 177.

[806] *Cf.*, Goodrich v. Harmsen, 442 F.2d 377 (C.C.P.A. 1971).

does not find that this activity rises to the level of misrepresentation and therefore does not find fraud.

Montedison [807] and Du Pont[808] also allege that Phillips supported its 1956 application by submitting misleading affidavits by Thornton [809] and Hogan and Banks[810] that were inconsistent with P-56, a 1952 in-house report written contemporaneously with Phillips's experiments.[811] Specifically, Montedison and Du Pont allege that these affidavits should have revealed that P-56 failed to characterize Phillips's products as crystalline and that it affirmatively stated that the recurring propylene unit structure had been eliminated as a possible structure for Phillips's product.[812]

The Court is unconvinced that these affidavits were fraudulent. They were submitted on June 7, 1957 in order to overcome a Patent Office rejection[813] of some of the claims in Phillips's 1956 application based on a reference published by Natta in the Journal of the American Chemical Society.[814] The affidavits honestly stated that Phillips had produced the product of the Count in 1952, and that at some intervening time the product had been conclusively determined to contain a crystalline structure. The report contained infrared spectra that conclusively evidenced the presence of recurring propylene units and propylene type crystallinity. Phillips later submitted P-56 to the Board

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[807] Montedison's Reply Brief, *supra* note 65, at p. 31.

[808] Du Pont's Brief, *supra note* 70, at p. 176.

[809] D-648, p. 74.

[810] *Id.*, p. 45.

[811] *See* text accompanying notes 433, 435, *supra.*

[812] P-56, p 8.

[813] D-648, p. 34.

[814] D-387.

and forcefully drew the Board's attention to it.[815] There is no reason to assume that the Patent Office might have been misled by Phillips's submission. The Court thus finds that these fraud claims are without merit.

Finally, Du Pont points out that Phillips's 1953 application disclosed production of a crude product containing 10.2% solids, while in subsequently attempting to overcome a Patent Office rejection of that application, Phillips offered an affidavit stating that 90% of the crude was solid.[816] Phillips states that Du Pont builds a fraud case on this alleged inconsistency.[817] This Court does not find that this claim was either raised before the Board or pleaded in the instant action. It is therefore not admissible in the present proceeding. If this claim were admissible, this Court would nevertheless hold that the latter statement was clearly mistaken, and that it was neither misleading nor material.

PATENTABILITY

Although the parties do not raise the general issue of whether the invention at issue here is actually patentable to Phillips, this Court believes that the issue must be decided. In *Hill v. Wooster,*[818] Wooster and Hill sought a patent for a "cabinet creamery". The Patent Office awarded priority to Hill, but the Circuit Court for the District of Vermont reversed this finding and awarded priority to Wooster. The lower court failed to address the patentability question which the parties to the suit appar-

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[815] Interference Paper No. 720, pp. 108-20.

[816] Du Pont's roposed Findings of Fact and Conclusions of Law, I.G. 26-28.

[817] Phillips' Brief, *supra* note 131, at pp. 410-11.

[818] 132 U.S. 693 (1889).

ently were willing to ignore. The Supreme Court held, however, that "neither the Circuit Court nor this Court can overlook the question of patentability".[819] Consideration of this issue was mandated by Section 4915 of the Revised Statutes which provided that if a Circuit Court adjudges an applicant entitled to receive a patent for his invention, the Court shall authorize the Commissioner to issue the patent:

> It necessarily follows that no adjudication can be made in favor of the applicant, unless the alleged invention for which a patent is sought is a patentable invention. The litigation between the parties on this bill cannot be concluded by solely determining an issue as to which of them in fact first made a cabinet creamery. A determination of that issue alone, in favor of the applicant, carrying with it, as it does, authority to the Commissioner to issue a patent to him for the claims in interference, would necessarily give the sanction of the court to the patentability of the invention involved.[820]

Hill v. Wooster's viability was retained in 1952 when Section 4915 was codified and re-enacted as 35 U.S.C. § 146. Section 146 still provides that a reviewing Court shall authorize the issuance of a patent, and Congress has not intimated that this phrase should be interpreted any differently than it was in *Hill v. Wooster*. Case law has, however, limited the situations in which it must be applied. In *Sanford v. Kepner*,[821] the Supreme Court held that as long as the reviewing Court agreed with the Board's Opinion it

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[819] *Id.*, p. 698.

[820] 132 U.S. at 698.

[821] 344 U.S. 13 (1952).

need not consider patentability. Thus if this Court had decided priority in favor of Montedison, it would be unnecessary to decide whether solid crystalline polypropylene is a patentable invention. Since this Court does not agree with the Board's findings, however, this case presents a situation identical to that in *Hill v. Wooster* and the patentability issues must now be considered.

Patentability generally includes at least three questions:[822] usefulness,[823] novelty [824] and non-obviousness.[825] In light of the previous discussion regarding the utility of Phillips's product, this Court finds that the product is useful either as a wax modifier or as a solid plastic. The Court also finds that Phillips's product was novel and non-obvious. As early as 1949 the Primary Examiners were required to determine that an invention is patentable prior to the declaration of an interference. Patent Office Rule 201 thus provides:

> (a) An interference is a proceeding instituted for the purpose of determining the question of priority of invention between two or more parties claiming substantially the same patentable invention and may be instituted as soon as it is determined that common patentable subject matter is claimed in a plurality of applications or in an application and a patent.[826]

In the instant case, the Primary Examiner extensively considered the novelty and non-obviousness issues in determining the Count's proper wording. Shortly after the

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[822] Rosenberg, Patent Law Fundamentals, pp. 116-17 (1975).

[823] 35 U.S.C. § 101.

[824] 35 U.S.C. §§ 101, 102.

[825] 35 U.S.S. § 103.

[826] 37 C.F.R. § 1.201.

Appendix B

Interference was declared, the parties began attempting on August 3, 1957 to amend the initial wording of the Count, claiming that the Count's description failed to distinguish the invention as novel over prior art. For example, Phillips attacked the original Count for failing to require that the crystalline component be substantial rather than insignificant, and cought to substitute counts reading:

> A. A solid polypropylene having a density in the range of about 0.90 to about 0.96.
>
> B. A solid polypropylene having a density in the range of about 0.885 to about 0.96.[827]

Montedison attacked the original Count as vague, apparently because it failed to require that the product contain substantial crystallinity[828] and because the original Count might have been interpreted to cover ethylene-propylene copolymers as well as propylene homopolymers.[829] Although Du Pont did not attack the wording of the original Count, it asked that the Count be interpreted so as to cover only homopolymers of polypropylene.[830]

During the next three years, the parties battled over these and other motions submitting nearly one hundred papers containing about one thousand pages of legal and scientific discussion seeking to clarify the language of the Count so as to leave no doubt that the defined invention was novel and non-obvious. The Primary Examiner denied the parties' motions on June 4, 1962, but on his own motion rephrased the Count to its present formulation, concluding: "the substituted count defines a novel and patentable solid

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[827] Interference Paper No. 32.

[828] Interference Paper No. 35.

[829] Interference Paper No. 41.

[830] Interference Paper No. 28.

polypropylene".[831] At the parties' request, the Primary Examiner subsequently reconsidered his decision but did not change it[832] Following unsuccessful appeals to the Commissioner of Patents,[833] the parties ceased to question the Examiners' decision. After the Board awarded priority to Montedison in 1971, the Patent Office immediately resumed consideration of the patentability issues concerning Montedison's patent application. The record concerning patentability was so thorough and dispositive that a full-time patent examiner felt that further work was unnecessary and that claims based upon the Interference Count were "allowable".[834]

This Court has carefully studied the records and finds that the product of the Count was novel and non-obvious. The Court accordingly finds that Phillips invention, being the product of the Count, is patentable to Phillips and that the Commissioner should be authorized to issue to Phillips the patent for solid crystalline polypropylene.

Any issues not specifically addressed in this Opinion have nevertheless been considered by this Court and found to be without merit. The foregoing Opinion constitutes this Court's Findings of Fact and Conclusions of Law as required by Federal Rule of Civil Procedure 52.

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[831] Interference Paper No. 179.

[832] Interference Paper No. 171.

[833] Interference Paper No. 132.

[834] P-945, Paper No. 1.

Appendix B

IN THE UNITED STATES DISTRICT COURT

FOR THE DISTRICT OF DELAWARE

STANDARD OIL COMPANY (INDIANA), Plaintiff, v. MONTEDISON, S.p.A., et al., Defendants.	CONSOLIDATED CIVIL ACTION No. 4319
PHILLIPS PETROLEUM COMPANY, Plaintiff, v. MONTEDISON, S.p.A., et al., Defendants.	
E. I. du PONT de NEMOURS & COMPANY, Plaintiff, v. MONTEDISON, S.p.A., et al., Defendants.	

MEMORANDUM OPINION
FOLLOWING ADDITIONAL BRIEFING AND
ARGUMENT ON THE ISSUE OF PATENTABILITY

Wilmington, Delaware
February 28, 1980

Appendix B

Wilmington, Delaware
February 28, 1980
WRIGHT, Senior Judge.

Shortly after releasing its Opinion of January 11, 1980, this Court requested that Phillips prepare and circulate among the parties a draft order conforming to the Opinion. Montedison and Standard objected to the inclusion of the proposed fifth paragraph, which provided:

> 5. That the invention of the count in issue is novel, useful and unobvious, and is patentable to John Paul Hogan and Robert L. Banks, and they and their assignee, the Phillips Petroleum Company, are entitled according to law to receive and have duly isued United States Letters Patent for the invention of said count.

Montedison and Standard claim that this Court was not required to decide whether solid crystalline polypropylene was patentable to Phillips and that this question should have been left for the Patent Office's determination.

The question of whether the general issue of patentability to Phillips should be determined was not raised by the parties during the course of the Interference proceeding, but occurred to the Court only as it neared completion of its Opinion, long after the submission of the parties' briefs. At that time, the Court considered requesting additional briefing on the necessity for determining patentability issues in a 35 U.S.C. § 146 proceeding. Such a course, however, might have signalled that the question of priority had been resolved against Montedison, since *Sanford v. Kepner,* 344 U.S. 13 (1952), clearly holds that a District Court need not discuss the patentability issue as long as it agrees with the Board of Interferences' decision. A request for additional brief-

ing prior to release of the Opinion would have placed the attorneys for Du Pont, Standard, and Phillips in a difficult position since they would not have known which position to articulate on the necessity for considering the issue of patentability in order to best serve their clients interests. For these reasons; the Court decided to address the question of patentability to Phillips in its Opinion and thereafter to permit the parties to address this decision prior to the filing of the final order.

Following this procedure, this Court considered the objections of Montedison and Standard and thoroughly reviewed its Opinion regarding the necessity for determining the issue of patentability to Phillips. The Court invited the parties, in its letter dated February 6, 1980, to consider about a dozen cases, *General Motors Corp. v. R. E. Deitz Co.*, 420 F.2d 1303 (D.C. Cir. 1969); *Pure Oil v. Socony-Vacuum Oil Co.*, 212 F.2d 454 (D.C. Cir. 1954); *Knutson v. Gallsworthy*, 164 F.2d 497 (D.C. Cir. 1947); *Cleveland Trust Co. v. Berry*, 99 F.2d 517 (6th Cir. 1938); *Potter Instrument Co. v. Mohawk Data Sciences Corporation*, 309 F.Supp. 866 (S.D.N.Y. 1969); *E. I. du Pont de Nemours & Co v. Celanese Corp.*, 291 F.Supp. 428 (S.D.N.Y. 1968); *Sperry Rand Corp. v. Bell Telephone Laboratories, Inc.*, 209 F.Supp. 598 (S.D.N.Y. 1962); *Turchan v. Bailey Meter Company*, 19 F.R.D. 201 (D.Del. 1956); *Shell Development Co. v. Universal Oil Products Co.*, 61 F.Supp. 925 (D.Del. 1954); *Keefe v. Gora*, 61 F.Supp. 629 (D.Conn. 1944), that it had previously studied, to submit additional briefing and, insofar as they felt it might be useful, to participate in oral argument The Court has now determined that its prior decision was legally correct.

The Court notes in its January 11th Opinion the equivalence between the facts presented in this case and those of *Hill v. Wooster*, 132 U.S. 693 (1890). The only real

question concerns the continued vitality of that ninety year old precedent. Unless or until its rule is modified, a court that overrules the Board of Patent Interferences and decides in favor of an appealing plaintiff must consider all questions of patentability to that plaintiff, whether or not the parties to a 35 U.S.C. § 146 proceeding actually raise those questions.

Montedison insists that subsequent statutes modified the *Hill v. Wooster* rule. The relevant portion of R.S. 4915, considered by the court in *Hill v. Wooster,* however, initially provided:

> ... And such adjudication, if it be in favor of the right of the applicant, shall authorize the commissioner to issue such patent on the applicant filinig in the patent-office a copy of the adjudication, and otherwise complying with the requirements of law....

Congress has altered this sentence only once, in 1952, changing it to read:

> ... Judgment of the court in favor of the right of an applicant to a patent shall authorize the Commissioner to issue such patent on the filing in the Patent and Trademark Office of a certified copy of the judgment and on compliance with the requirements of law.

35 U.S.C. § 146.

According to the accompanying Senate Report, the 1952 alterations, which were considered and enacted in the context of a general patent law codification, were considered insignificant:

> The next chapter [§§ 141-146] relates to the review of Patent Office decisions.

Appendix B

. . . .

This group of sections makes no fundamental change in the various appeals and other review of Patent Office Action, but has made a few changes in the procedure in various instances to correct some of the problems which have arisen, particularly in Section 146. These details are mainly procedural.[1]

Montedison notes that the first portion of R.S. 4915 provided:

Whenever a patent or application is refused, either by the commissioners of patents or by the Supreme Court of the District of Columbia upon appeal from the Commissioner, the applicant may have remedy by bill in equity. . . .

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[1] In later sections, the Report specifically identified the changes:

The first paragraph and parts of the second paragraph [of § 146] are based on title 35, U.S.C., 1946 ed., § 63 (R.S. 4915, amended (1) Mar. 2, 1927, Ch. 273 § 11, 44 Stat. 1336, (2) Mar. 2, 1929, Ch. 488, § 2(b), 45 Stat. 1476, (3) Aug. 5, 1939, ch. 451, § 4, 53 Stat. 1212), limited to interferences and making some changes. The action is not restricted to applicants, but [a patentee may also bring the action.] The time for bringing the action is made the same as for appeals.

In the second paragraph the first sentence is new and eliminates difficulties arising from unrecorded interests.

The second sentence is based on 35 U.S.C., 1946 etd., § 72a (Mar. 3, 1927, ch. 364, 44 Stat. 1394, reenacted Oct. 31, 1951, ch. 655, § 53a, 65 Stat. 728) with changes in language.

The fourth sentence is new and prevents such suits from being filed against the Commissioner as a defendant; however, the Commissioner has the right to intervene.

Language is changed.

Appendix B

In contrast, § 146 now provides:

> Any party to an interference dissatisfied with the decision of the board of patent interferences *on the question of priority,* may have remedy by civil action. . . . (emphasis added).

Montedison contends that the addition of the new language " 'on the question of priority' . . . can only be read as a legislative decision that limited the scope of review in a § 146" to questions of priority and excluded all questions of patentability.

Montedison's argument misconstrues the added language. The original §4915 failed to distinguish among the various appealable Patent Office decisions refusing a patent. All such decisions received identical treatment under § 4915. In codifying the patent law, Congress sought to vary the appeals procedures for different Patent Office decisions. Section 145 was thus enacted to control appeals from decisions by the Board of Patent Appeals and § 146 to control appeals from decisions by the Board of Patent Interferences on the question of priority. Once a plaintiff brings the latter type of appeal, as Du Pont, Standard and Phillips did here, the case is governed by § 146, which does not alter the basic nature of the appeal. *E. I. du Pont de Nemours & Co. v. Celanese Corporation*, 291 F. Supp. 428, 432 n. 3 (S.D.N.Y. 1965), expressly rejects Montedison's argument relating to possible language changes, and a number of recent cases indicate the continued application of *Hill v. Wooster* to § 146 proceedings.

In *Sanford v. Kepner*, the Supreme Court noted, "The principle of the *Hill* case is that the court must decide whether claims show patentable inventions before authorizing the Commissioner to issue a patent." *Id.* at 15. Rather than overruling this principle, the court merely

distinguished the fact situation presented by *Sanford*, a case in which the lower court decided against the plaintiff, from that presented in *Hill v. Wooster* where the lower court decision favored the plaintiff, and concluded that "only if the [plaintiff] wins on priority" does the statute require a court to find that the invention is patentable to that plaintiff before authorizing the Commissioner to issue a patent.

General Motors Corp. v. R. E. Dietz Co., 420 F.2d 1303 (D.C. Cir. 1969) presented a situation similar to that of *Sanford*. In refusing to consider the patentability issue there, the Court noted: "The Supreme Court [has] held that only if the District Court finds priority in the [plaintiff] may it, as a necessary corollary of the power to authorize issuance of a patent, reach the issue of patentability." *Id.* at 1305.

In *Pure Oil Co. v. Socony-Vacuum Oil Co.*, 212 F.2d 454 (D.C. Cir. 1954), the Interference Board found that Pure Oil, rather than Shell Development Company or Socony, had priority to the involved invention. The District Court reversed, finding "that, if the count be patentable, Socony is entitled to the patent." 111 F.Supp. 197, 201 (D. D.C. 1953):

> . . . Even though the parties to an action under § 4915 are willing to ignore the question of patentability and to litigate merely the question of priority, the court cannot overlook the question of patentability, since no adjucation can be made in favor of any applicant unless his alleged invention is a patentable one.* Inasmuch as the court finds that Socony is entitled to priority rather than Pure Oil, the issue of patentability must be determined in this case.
>
> * Hill v. Wooster, 132 U.S. 693, 698, 10 S.Ct. 228, 33 L.Ed. 502.

Id. at 208. The District Court proceeded to determine whether the product of the Count was patentable to any of the parties. One factor that strongly influenced the Court was the fact that the Patent Office had previously ruled that the Interference Count was patentable.

> . . . Since it was the view of the Patent Office that the subject of the interference count is patentable, the Patent Office must have determined that the disclosure is not included in any prior patent issued to . . . [Socony's assignee]. The strong presumption of the correctness of the decision of the Patent Office as to patentability must be overcome by evidence that it is clearly erroneous. There is no such evidence in the instant case.
>
> For the foregoing reasons, the court holds that the interference count is patentable as to . . . . [Socony's assignee].

Id. at 210. The Circuit Court affirmed, ruling:

> . . . Under the doctrine of *Hill v. Wooster*, 1890, 132 U.S. 693, 10 S.Ct. 228, 33 L.Ed. 502, the court could not properly hold that a plaintiff under Rev.Stat. § 4915 . . . was entitled to a patent unless it could make an affirmative finding that the claim was patentable. Likewise, if the court found the claim unpatentable, it could not grant the relief sought. . . .

212 F.2d 454, 457.[2]

In *Sperry Rand Corp. v. Bell Telephone Laboratories, Inc.*, 208 F.Supp. 598 (S.D.N.Y. 1962), the Court again

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[2] Indeed, the Circuit Court held that the District Court had properly considered patentability to a losing palintiff (Shell Oil) and to a losing defendant (Pure Oil).

overturned the Interference Board and ruled in favor of a plaintiff.

> It appears that in a Section 146 proceeding where the issue of priority is resolved in favor of the plaintiff the court is required to consider whether the plaintiff is in all respect entitled to a patent. Hill v. Wooster, 132 U.S. 693, 10 S.Ct. 228, 33 L.Ed. 502 (1890); Sinko Tool & Mfg. Co. v. Automatic Devices Corp., 136 F.2d 186, 189 (2d Cir. 1943); Wiegand v. Dover Mfg. Co., 292 F. 255 (N.D. Ohio 1923).
>
> In Sanford v. Kepner, 344 U.S. 13, 73 S.Ct. 75, 97 L.Ed. 12 (1952) it was held that in a Section 146 proceeding where the plaintiff had not established priority, the court was not required to pass on the patentability of the defendant's invention. . . .
>
> . . . .
>
> The situation is entirely different, however, where the *plaintiff* is able to establish priority, since it then becomes necessary for the Court to adjudicate the question of patentability of the *plaintiff's* invention in order to be able to direct the Commissioner to issue a patent to the plaintiffs. Hill v. Wooster, supra. (emphasis in original).

Id. at 602 (footnote omitted).

The Court then considered whether the invention was patentable to the plaintiff. Once again the fact that the Patent Office had previously decided patentability significantly influenced the Court:

> There seems no reason for the Court to review the question of patentability any further, inasmuch as the Patent Office by its earlier grant of a patent to the defendant has recognized that the invention here at

> issue was a "new and useful" machine within the meaning of 35 U.S.C. § 101 and that it was not an obvious improvement in the prior art so as to be barred under 35 U.S.C. § 103. This aspect of the invention, which was favorably passed on by the Patent Office, is not contested and need not be further considered.

Id. at 605.

In *Potter Instrument Co. v. Mohawk Data Sciences Corp.*, 309 F.Supp. 866 (S.D.N.Y. 1969), plaintiff sought to amend his complaint to litigate whether the product of an interference count was patentable to the defendant in whose favor the Board had ruled. The Court refused plaintiff's motion, noting:

> I am not presented herein, as the Court was in Sperry Rand Corp. v. Bell. Tel. Laboratories, Inc., 208 F.Supp. 598 (S.D.N.Y. 1962), appeal dismissed, 317 F.2d 491 (2d Cir. 1963), with a situation where the plaintiff is able to establish priority and it therefore becomes necessary for the Court to adjudicate the question of the patentability of plaintiff's invention in order to direct the issuance of a patent to plaintiff. The present situation, rather, is analygous to Sanford v. Kepner, 344 U.S. 13, 73 S.Ct. 75, 97 L.Ed. 12 (1952), where it was held that if the trial court decides the factual issue of priority against plaintiff and thus affirms the Patent Office, plaintiff has obtained the full remedy the statute gives him. . . .

Id. at 868.

Turchan v. Bailey Meter Company, 19 F.R.D. 201 (D.Del. 1956), presented a situation where the license of an interference party against whom the Board of Patent Interferences had decided, sought to participate in a § 146 action.

The licensee conceded that the interference parties would fully litigate the priority issue, but it wanted to litigate whether the invention was patentable to the defendant. Judge Rodney noted:

> There is thus raised again the question of whether in a proceeding under 35 U.S.C. § 146 if the plaintiff does not establish priority the Court should or may proceed further and consider the question of validity. Stemming from Hill v. Wooster, it is well established that if priority is accorded to the plaintiff the Court should then proceed to determine validity. This is because the Court having established priority would adjudge the plaintiff to be entitled to a patent and this should not be done unless validity be also established. (footnotes omitted).

Id. at 208. Judge Rodney then distinguished *Hill v. Wooster* from the situation in *Sanford v. Kepner* by which his case was governed.

Since the codification of § 146, then *Hill v. Wooster* has been widely viewed as a viable precedent requiring a District Court, in overturning a Board of Interference decision, to determine patentability to the prevailing plaintiff.

Standard argues that the prior decisions of this Court and the Third Circuit in this case, *Standard Oil Co. v. Montedison, S.p.A.*, 540 F. 2d 611 (3d Cir. 1976); *Standard Oil Co. v. Montedison, S.p.A.*, 431 F. Supp. 1064 (D. Del. 1977), negated the *Hill v. Wooster* rule. Standard misconstrues these earlier cases which determined what fraud issues might be raised for the first time in a § 146 proceeding. These decisions permitted the parties to allege and prove fraud affecting the historical date of a party's priority, an issue that is especially important in a § 146 action which is "as the Supreme Court pointed out in Sanford v. Kepner, (citations omitted) . . . in the first instance directed solely to the review of the decision of the Board

on the factual issues of priority. . . ." 540 F. 2d 611. If an applicant commits fraud relating to the historical date of a party's priority and another applicant is thereby hindered from prosecuting its priority position, it is important to correct for the effect of that fraud before priority is finally determined, and a possibly well deserving party is denied priority. A reviewing court must therefore consider claims of fraud relating to the historical date of a party's priority, and, if fraud has harmfully affected the Patent Office's findings regarding a party's priority date, the Court must overturn those findings and independently reassess the submitted evidence.

Standard, however, sought to amend its complaint to charge an entirely different kind of fraud, the type that might have produced an unjustifiably favorable decision regarding the question of patentability. If a party to an interference prevails, and a patent issues, enforcement of the patent can only be effectuated in a subsequent infringement suit, where patentability, including fraud issues relating to that question, may then be examined. If the court in the infringement action ultimately determines that the invention was not patentable, it can invalidate the alleged patent rights. Since possible frauds favorably affecting the patentability of an invention may be thus corrected for in an infringement proceeding, there is no need to consider them in connection with an interference. The earlier decisions in this case thus prevented a party from amending its complaint to raise possible fraud issues in connection with patentability. They did not prevent any party from raising patentability issues.

Monteidson finally claims that none of the parties addressed the patentability issue in this § 146 proceeding, and that it is therefore improper to decide the issue. Montedison's argument, however, ignores the fact that the parties, particularly Montedison, used this § 146 proceeding to address patentability issues, albeit narrow ones. Indeed,

Montedison raised a patentability issue against Phillips,[3] Phillips responded,[4] Phillips raised patentability issues against the other parties,[5] and Montedison[6] and Standard[7] responded.

Moreover, Montedison's argument ignores the situation presented in *Hill v. Wooster*, where, although the Patent Office, the lower courts, and the parties all failed to address patentability issues, the Supreme Court nonetheless decided patentability. Rather than demonstrating that this Court should not consider patentability to Phillips, Montedison's point demonstrates that the product of the Count is in fact patentable to Phillips. A number of courts place more weight upon the Patent Office's determination of patentability when the parties do not challenge this determination during the § 146 trial and subsequent briefing. *See e.g. Sperry Rand Corp. v. Bell Telephone Laboratories, Inc.*, 208 F.Supp. 598 (S.D.N.Y. 1962); *Pure Oil Co. v. Socony-Vacuum Oil Co.*, 212 F.2d 454 (D.C. Cir. 1954).

In sum, *Hill v. Wooster* requires this Court to determine whether solid crystalline polypropylene is patentable to Phillips. A careful study of all the evidence submitted in this proceeding and before the Patent Office shows that the product of the Count is patentable to Phillips. This Court accordingly authorizes the issuance of a patent to Phillips and signs the Phillips proposed order, including the controversial fifth paragraph.

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[3] Montedison's Main Brief After Trial, pp. 16-17. Montedison's arguments are discussed in the text accompanying footnotes 637-641 and 647-649 of this Court's January 11, 1980 Opinion.

[4] Phillips' Reply Brief, pp. 7-8.

[5] Phillips' Brief, pp. 209-212. Since the Court decided priority for Phillips, it was unnecessary to reach this issue.

[6] Montedison's Main Brief After Trial, pp. 60-64.

[7] Post Trial Brief of Plaintiff Standard Oil Company (Indiana) With Respect to Priority, pp. 169-170; Reply Brief of Plaintiff Standard Oil Company (Indiana) With Respect to Priority, p. 90.

APPENDIX C

Opinion of the Board of Patent Interferences of the United States Patent Office.

Final Hearing
October 28 and 29, 1970

Paper No. 738
JSB/LHG/dlr

IN THE UNITED STATES PATENT OFFICE

BEFORE THE BOARD OF PATENT INTERFERENCES

Patent Interference No. 89,634

Hogan et al. vs. Zletz vs.
Baxter et al. vs. Natta et al.

Polymer Composition

Application of John Paul Hogan and Robert L. Banks filed January 11, 1956, Ser. No. 558,530.

Application of Alex Zletz filed October 15, 1954, Ser. No. 462,480.

Application of Warren Nesmith Baxter, Nicholas George Merckling, Ivan Maxwell Robinson and Gelu Stoeff Stamatoff filed December 30, 1955, Ser. No. 556,548. Accorded benefit of Ser. No. 451,064 filed August 19, 1954.

Appendix C

Application of Giulio Natta, Piero Pino and Georgio Mazzanti filed June 8, 1955, Ser. No. 514,099. Accorded benefit of No. 24,227 filed June 8, 1954 (Italian).

Bailey, Gaston, and Milestone, Examiners of Interferences

Bailey, Gaston, Examiners of Interferences.

The subject matter of this interference is adequately described in the sole count which reads as follows:

> Normally solid polypropylene, consisting essentially of recurring propylene units, having a substantial crystalline polypropylene content.

As originally desclared on September 9, 1958 this interference involved the following parties on the basis of applications:

	S.N.	Filed
Hogan et al.	558,530	Jan. 11, 1956
Baxter et al.	556,548	Dec. 30, 1955
Natta et al.	514,099	June 8, 1955
Vandenberg	523,621	July 21, 1955
Zletz	462,480	Oct. 15, 1954

In the declaration Vandenberg was accorded the benefit of his prior application S. N. 500,041 filed April 7, 1955.

During the motion period a number of motions to dissolve, to amend, to shift the burden of proof and to de-

clare additional interferences were filed by various of the parties. It was urged that the original count was vague, indefinite, inaccurate and unpatentable over certain prior art.

In his Decision on Motions of June 4, 1962 (Paper No. 132) the examiner, on his own motion, substituted the present count for the original count "so as to clearly avoid objections raised by the parties with respect to the present count." The examiner stated that this count defined novel and patentable polypropylene and held that each of the parties has a right to make the examiner's proposed count. The examiner also held that the count was also supported in the following prior applications:

Natta et al.	No. 24,227 (Italy) filed June 8, 1954
Baxter et al.	S.N. 451,064 filed August 19, 1954

but that the count was not supported by the prior application of Zletz, S.N. 223,641 (filed April 28, 1951), or by the Hogan et al. prior application, S.N. 333,576 (filed January 27, 1953). The motions to shift the burden of proof were, therefore, granted to the extent that the order of parties was changed to Hogan et al. v. Vandenberg v. Zletz v. Baxter et al. v. Natta et al.

A number of the above holdings of the examiner relating to the support for the count in various of the applications have been presented for our review at final hearing.

On November 26, 1963 Vandenberg was placed under order to show cause why judgment should not be rendered against him in view of the fact that he alleged no date in his preliminary statement prior to the Zletz filing date and had not challenged the support for the present count 2 in the Zletz application (see Paper No. 188). On October 6, 1964, judgment (Paper No. 214) was rendered against Vandenberg in view of the fact he had not made a sufficient

showing in response to the above order. The record shows that no November 10, 1964 Vandenberg filed Civil Action No. 2794-64 in the United States District Court for the District of Columbia challenging the above judgment and the court decided to hold the case in abeyance until a final award of priority had been made in the interference (see 145 USPQ 647). Pursuant to the decision of the First Assistant Commissioner of August 25, 1965 (Paper No. 250) Vandenberg will be given notice that final judgment is entered.

All the remaining parties (Hogan et al., Zletz, Baxter et al. and Natta et al.) have presented voluminous records including a large number of exhibits, both documentary and physical, have filed extensive briefs for our consideration and were represented at final hearing.

A substantial portion of the testimony and exhibits is presented as a consequence of successful Civil Actions relating to discovery in various District Courts. The parties have also filed various notices under the provisions of Rule 282, and Hogan et al. have filed a motion under Rule 243, (Paper No. 688) to "Record on Final Hearing Certain Excluded Evidence." Natta et al. have filed motions to strike portions of the Baxter et al. brief, and Zletz has filed objections to certain exhibits presented by Natta et al. These motions and notices under Rule 282 are opposed, and consideration of these motions etc. and the oppositions thereto have been deferred to final hearing.

In the above-mentioned motion under Rule 243 to record certain "excluded evidence" Hogan et al. are relying on the provisions of Rule 43(c) of the Federal Rules of Civil Procedure. The "excluded evidence" to which Hogan et al. motion under Rule 243 is directed is testimony taken in Italy in connection with another action (Civil Action No. 3738) which testimony they have sought to have entered for use in this interference under Rule

283. As we pointed out in our decisions of April 8, 1970 (Paper No. 574) and May 6, 1970 (Paper No. 611) Hogan et al. have not made the showing required by Rule 283. Also, it is not clear that all the parties of this interference were parties to the above Civil Action. We conclude that the provisions of Rule 43(c) of the Federal Rules of Civil Procedure do not apply to interference proceedings in the Patent Office, particularly under the circumstances of this case. For this reason the Hogan et al. motion under Rule 243 is denied.

With respect to the other motions, objections, oppositions etc. it is not practical for us to include in our opinion a specific ruling on each individual motion, opposition etc. presented. However, in arriving at our conclusion we will consider only the testimony and exhibits which have been properly introduced into the record (see Rule 271) and we will accord to the testimony and exhibits the weight to which they are entitled. In our discussion of the cases presented by each of the parties it is not practical for us to include a detailed discussion of all the testimony and exhibits appearing in the record or all the arguments advanced in the briefs. However, we have considered the entire record as well as all arguments advanced by the parties.

In our discusion, the records of the respective parties will be designated as HR (for the Hogan et al. record) ZR (for the Zletz record) etc. while the exhibits and cross exhibits will similarly be designated as HX and HCX etc.

CASE FOR NATTA ET AL.

The Natta et al. application is assigned to Montecatini-Edison S.p.A. (Montecatini). Natta et al. rely upon the June 8, 1954 filing date of Italian application No. 24,227 for conception and constructive reduction to practice under 35 U.S.C. 119. Natta et al. also urge that if they are

denied the June 8, 1954 priority date they are entitled to the benefit of the July 27, 1954 filing date of Italian application No. 25,109. It is noted that Natta et al. filed a timely claim for the benefit of these applications and complied with the formal requirements of 35 U.S.C. 119 with respect to these foreign applications.

In the above Decision on Motions the Natta et al. motion to shift the burden of proof was granted, the examiner holding that the Italian application No. 24,227 filed June 8, 1954 and relied on by Natta et al. under 35 U.S.C. 119 supported the count (the present count) substituted on the examiner's own motion. On August 26, 1968 Baxter et al. filed a "Motion to Vacate Senior Party Status of Natta et al." (Paper No. 358) in which it is asserted that newly discovered evidence in a related interference involving Baxter et al. and Natta et al. shows that the Italian application of June 8, 1954 was not filed on behalf of Natta, Pino and Mazzanti the inventors named in the involved Natta et al. application. Baxter et al. point out that only Natta was nominated inventor in the Italian application and that Italian patent No. 535,712, granted November 17, 1955, named only Natta as the inventor. Baxter et al. urge that in view of the above-noted discrepancy of inventorship Natta et al. are not entitled to the effective filing date of June 8, 1954 granted to them by the examiner. Baxter et al. cited the decision in Schmidt et al. v. Babcock et al., 54 CCPA 1392, 153 USPQ 719, in support of their motion.

Baxter et al. further contend that Natta et al. are not entitled to the July 27, 1954 filing date of Italian application No. 25,109 (also relied on by Natta et al. in their Motion to Shift the Burden of Proof) because it is not the "first filed" foreign application.

Pursuant to our order of September 15, 1969 (Paper No. 460) both Baxter et al. and Natta et al. took testimony and submitted exhibits which, it is urged, relate to the right of

Natta et al. to rely on the prior Italian applications under the provisions of 35 U.S.C. 119.

We note that neither Baxter et al. nor any other junior party urges that the disclosures of mentioned Italian applications do not support the count. There is no dispute that in the June 8, 1954 Italian application Natta was nominated inventor and that the patent subsequently issued showing this fact and that a number of applications were filed in other countries based on the June 8, 1954 Italian application and that in a number of these (e.g. Spain, Cuba, Mexico and Iraq) Natta was identified as inventor.

In their briefs Baxter et al. and Natta et al. have cited Schmidt et al. v. Babcock et al., supra, which deals with the question of discrepancy of inventorship of a domestic application and that of a foreign application relied on under 35 U.S.C. 119. As was stated in the above decision, where the inventive entity differs in the foreign and in the United States application, the priority date should not be recognized by the examiner "until the inconsistency or disagreement is eliminated." It is clear from the Court's decision that in determining whether the priority application is "regularly filed" in a foreign country as provided in section 119 it is not necessary that the provisions of 35 U.S.C. 116 or Rule 45 (which apply to applications filed in the United States) be complied with. In that case, as here, the question involved was whether the application filed in the foreign country was filed on behalf of the joint inventors named in the United States application. The substantive question as to the adequacy of the disclosure of the invention involved is, of course, determined on the basis of the requirements of United States law.

Here Natta et al. have presented the testimony of Guglielmetti, who held a degree in jurisprudence, had practiced law since 1946 especially in the field of patents and was, at the time of his testimony, Professor of Law at the University of Pavia. Guglielmetti identified NX-864 as some

articles of the (Italian) Civil Code relating to patents which were in effect as of June 1954 and are still in effect. Guglielmetti testified that under the above articles any person, either physical or juridical, who has the right to file the application, who may be the assignee of the inventor, may file the application in their own name. NX-866 was identified as a "certification" from the Italian Patent Office which sets out the meaning of Articles 27 and 19 of the Royal Decree No. 1127 of June 29, 1939. Certain other exhibits (NX-867 to NX-870) were identified as portions of texts relating to the filing of patent applications in Italy and the naming of inventors therein.

These exhibits and the testimony establish that a company which sponsors and finances investigations which result in an invention, or to which the invention has been assigned, may apply for a patent therefor in Italy and that it is not obligatory on the company to name the actual inventor or inventors of the subject matter of the invention in the application or the patent granted thereon. This testimony and accompanying exhibits also establish that the applicant who is not the actual inventor may name the inventor (in the application or patent) and in the case where there are joint inventors he may name one or more of them and is not obliged to name all of the joint inventors. It also appears from the record that the Italian Patent Office requires no proof of the applicant's rights to file a patent application, makes no investigation as to who the actual inventor may be or whether all of the joint inventors have been named and that the failure to name all of the inventors has no effect on the validity of an Italian patent (NR-6172).

The record establishes further that under Italian law, although an inventor may assign his right to a patent, he retains the right to request that his name appear in the Patent Register and in the letters patent. Pino testified that although he considered himself, together with Natta

and Mazzanti, a joint inventor of the polypropylene product described in the (U-59) Italian application filed June 8, 1954, it was his suggestion that only Natta be named inventor on the first patent in recognition of the fact that it was he (Natta) who had the first idea of the work (NR-5513 to 5520) Pino stated, however, that he was entitled to be named in connection with scientific articles and papers on this subject. Mazzanti similarly testified that he considered that he was a joint inventor of the polypropylene of Italian application U-59 but he regarded it more important to be named as the author of scientific papers. Mazzanti stated that he had discussions with Pino on this matter.

The record shows that Natta was, in 1954, the Director of the Institute of Industrial Chemistry which was a "subordinate" institute of the Polytechnic Institute of Milan. Natta at that time was a Monecatini consultant and Pino was his assistant, supervising research in the field of organic chemistry at the institute. The record shows that Montecatini sponsored one year courses in industrial chemistry at Natta's institute for classes of chemists who were employees of Montecatini, that Mazzanti was a member of a class of such chemists and that at the end of his one year course he remained at the institute to assist Pino in the supervision of subsequent classes of chemists sponsored by Montecatini.

In 1952 Natta learned of work of Professor Karl Ziegler of the Max Planck Institute at Mulheim-Ruhr, Germany, involving the use of aluminum alkyls to produce polymers of ethylene. It appears that some experimental work in this field was done at Natta's Institute beginning about September 1952. The record indicates that near the end of 1953 Montecatini obtained copies of Ziegler German patent applications relating to the manufacture of high molecular weight polyethylene. Pino testified that in January 1954 he had discussion with Natta about the Ziegler

patent applications and that Natta proposed that propylene (as well as styrene) should be tried as a monomer to be polymerized with the catalyst disclosed in the Ziegler patent applications.

The record shows that the first experiment involving the use of titanium tetrachloride with an aluminum alkyl as a catalyst for polymerizing polypropylene was carried out by Chini at the request of Natta/or Pino. It appears that from this experiment, carried out on March 11, 1954, only a small amount of a solid polymer was obtained. Chini testified (BR-3264) that at this time he did not really understand anything about the nature of the polymer other than "it was a high polymer, high molecular weight polymer." It appears that Chini was scheduled to leave Milan shortly thereafter for Ferrara where he was to work on the preparation of aluminum alkyls and on the preparation of polypropylene, both in large quantities.

The record shows that Mazzanti and Longi began working with Chini in carrying out further experiments using the Ziegler catalyst in the polymerization of propylene. Chini testified that he was training Mazzanti and Longi "in order that they would be able to continue this work on olefin polymerization" after Chini left Milan. Second and third experiments were carried out on March 15, 1954 and March 24, 1954 respectively by Chini, Mazzanti and Longi under the supervision of Pino. On being questioned about the inventive contributions of Pino and Mazzanti Chini testified, (BR-3401, 3423, 3424):

XQ 923 Dr. Chini, did you ever say to anyone that Pino and Mazzanti were not inventors of polypropylene?

A No, and I can not say this now. They have given a big contribution to the polyolefins. They have discovered that titanium trichloride—they discovered that

normal propyl aluminum is best catalyst with aluminum triethyl. So they have contributed really to this field.

XQ 924 And you have never said they didn't?

A No. It is a question of stage.

XQ 1073 Professor Chini, do you know whether or not there were discussions between Pino, Natta, and Mazzanti in the laboratory at Polytechnic Institute of Milan in the first half of 1954?

A There were discussions. Surely there were discussions.

XQ 1074 Were you present at all of them?

A No.

XQ 1075 Were you present at any of them?

A Any?

XQ 1076 Were you present at any discussion at which Natta, Pino and Mazzanti also participated?

A I cannot remember. I assume I was present in some of them but I cannot remember.

Chini left Milan on or about April 11, 1954 and did not thereafter carry out any further experiments using titanium tetrachloride and aluminum alkyl composition as a catalyst for polymerizing propylene prior to June 8, 1954 when application U-59 was filed. The products obtained in the above-mentioned experiments were extracted, and the insoluble residues sent for X-ray and infrared analyses and for molecular weight determinations. Further polymerizations of propylene were carried out by Mazzanti and Longi after Chini left Milan and prior to the filing of the U-59 application.

Appendix C

Both Mazzanti and Pino testified with respect to joint discussions, which included Natta, with regard to carrying out the polymerization of propylene with titanium tetrachloride and aluminum alkyl as a catalyst. Mazzanti actually took part in the experimental work, while Pino and Mazzanti cooperated in the identification of the chemical structure and stereo structure of the solid product. The record shows that the solid products resulting from the above experiments carried out by Chini, Mazzanti and Longi were subjected to X-ray examination. Corradini testified that he performed infrared and X-ray work at the Polytechnic Institute. Corradini testified that in March 1954 he ran an X-ray analysis of a sample received from Chini and represented to be polypropylene and that he orally reported the results of the analysis to Natta. Corradini identified NX's-385 through 388 as X-ray spectra (of samples of polypropylene) which bear dates of March 11, 1954 to March 26, 1954 which were run by him. Corradini stated (NR-2584 to 2586) that in the period from March to June 1954 he discussed these spectra with Natta, Pino and Mazzanti and that eventually other persons participated in the discussions and that these discussions related to the chemical structure, crystallinity, mechanical and physical properties of the products as well as the mecahnisms of the polymerization and the planning of further work. Corradini testified as to preparing spectra of other samples of polypropylene, some of which are identified as having been extracted, and discussing the results with Natta, Pino and Mazzanti. It also appears that some of the X-ray data used in the drafts of the U-59 application were supplied by Corradini. Mazzanti testified that conclusions as to the chemical structure and the steric structure of the different fractions of the polypropylene were arrived at in discussions that took place between Natta and Pino, Natta and Mazzanti and at discussions involving Natta, Pino and Mazzanti.

Appendix C

The record shows that Natta, Pino and Mazzanti cooperated with deVarda (who was the head of the Patent Department of Montecatini) in the preparation of the patent application (U-59) which was filed on June 8, 1954 in Italy. A number of copies of rough drafts of this application bearing notations in the handwriting which has been identified variously as being that of Mazzanti, Pino, Natta and deVarda have been submitted as exhibits. There does not appear to be any dispute between Natta et al. and the junior parties with respect to the actual preparation of the Italian application U-59.

It appears that early in 1955 Montecatini began scheduling the filing of patent applications corresponding to Italian applications U-59 and U-63 (filed on July 24, 1954). Pirani was employed in the Patent Department of Montecatini and assisted in the preparation of United States applications corresponding to the above Italian applications. The record shows that, under an agreement between Montecatini and Professor Ziegler, Dr. Von Kreisler (German patent agent for Ziegler) had responsibility for preparing applications to be filed abroad. Herzfeld who worked in the office of Mr. H. A. Toulmin, Jr. (Toulmin and Toulmin) in Washington, D.C. collaborated in the preparation of the corresponding United States applications.

Both deVarda and Pirani testified with respect to certain correspondence and other activities concerning the preparation of the United States applications corresponding to applications U-59 and U-63. The record shows that three applications identified as Case I, Case II and Case III were prepared and filed in the United States. Case III (Serial No. 514,099) directed to the polyolefin product, is the Natta et al. application involved in this interference.

The record includes as exhibits a number of letters and other communications between Toulmin and Toulmin in

the United States and Montecatini as to whether Ziegler should be named as a coinventor in the application to be filed in the United States in view of the fact that the applications were directed to and disclosed the use of a catalyst composition used by Ziegler for polymerizing ethylene. It was ultimately decided that Ziegler was not a coinventor of the subject matter of the above-mentioned United States applications.

In some of the letters, for example BCX's-66, 75, 76, 79, 80 and 81, it is indicated that Natta is the inventor of the subject matter. However deVarda testified (NR-5248 to 5260) that it was clearly understood by him that references to Natta in these documents referred to and included Natta and his coworkers Pino and Mazzanti. It is noted that these exhibits bear dates ranging from November 29, 1957 to October 1, 1958 which is long after the involved Natta et al. application (Case III) was filed in the United States naming Natta, Pino and Mazzanti as the coinventors and, as will be pointed out below, after a second investigation of the question of joint inventorship was made by Toulmin.

Pirani testified (NR-3418, 3419 and 3420) that the letter from Toulmin and Toulmin dated 20 April 1955 (NX-499) which relates to Case I came to his attention. This letter includes the statement (on page 2): "We have drawn up a specification assuming that Professor Natta is the sole inventor." Pirani further testified that he had had many conversations and discussions with Natta, Pino and Mazzanti and from the discussions he had with them at the time he was satisfied that the work done in connection with the polymerization of propylene in the early part of 1954 and in the laboratory of Polytechnic under the direction of Natta had been the joint work of Natta, Pino and Mazzanti and that he (Pirani) was satisfied that the applications to be filed in the United States would have to name these three men as coinventors. In testifying with respect to BX's-67,

68, 70 and NX-506 Pirani stated (NR-3435 to 3440) that at that time (May 1955) it had been established that Pino and Mazzanti were coinventors along with Natta and this fact was of importance in connection with the filing of the United States applications in question. The above exhibits state or suggest that Case I would be made joint "As in Cases II and III." This indicates that by the dates on the exhibits it had already been determined that the inventors of the subject matter of Case III were joint (Natta, Pino and Mazzanti). Pirani also testified that he did not take any action to change the nomination of the inventors in the Italian application filed June 8, 1954 (U-59) as suggested in the last paragraph of BX-70 (letter from Montecatini to Toulmin and Toulmin dated May 30, 1955) because he did not consider it necessary in view of the fact that the naming of the inventors in an Italian patent application is optional.

It appears that the question of bonuses for Pino and Mazzanti as inventors as provided by Iailian law arose at Montecatini in the spring of 1965. The record includes a number of exhibits which are documents relating to the extent of the inventive contributions of Pino and Mazzanti to the inventions of Italian application U-59 as well as certain other related applications. The record indicates that Natta and deVarda had discussions about this during this period.

On October 22, 1969 Baxter et al. and Natta et al. filed a stipulation (Paper No. 504) with regard to answers which would be given by Natta and Pirani in response to certain interrogatories filed by Baxter et al. on October 6, 1969 (Paper No. 493). The stipulation also refers to an affidavit by Pirani. In his answers Natta admitted that in the period of 1953 through 1966 he was a consultant to Montecatini and that he prepared and sent the letter dated March 26, 1965 (a copy of which was attached to the interrogatories) to deVarda. This letter (which also appears

in the record as NX-644, tab 3) is in reply to an inquiry "about the inventive contributions in patents U.59, U.63 and U.73." The letter refers to the contribution of Pino as being "minimal at the beginning" and states that Mazzanti's contribution "has been principally that of effecting the experimental work, a task he has performed with great diligence." On page two of the letter (English translation) Natta stated:

> I agree therefore with your evaluation that Prof. Pino's contribution may be estimated at approximately 10% and that Prof. Mazzanti's contribution may not be estimated to be greater.

The answers given by Pirani as stipulated relate primarily to certain documents attached to the interrogatories addrissed to Pirani (Paper No. 493). These documents, which also appear in the record as exhibits, are copies of certain correspondence from the files of Montecatini relating to the nominations of inventors in cases U-59 and U-63. The exhibits involved were some of those about which Pirani testified as indicated above.

Mrs. Peake, who is the attorney of record for Natta et al., was called to testify on behalf of Baxter et al. She testified that in the period from 1952 until February 1961 she was associated with the firm of Toulmin and Toulmin in Washington, D.C. and that she rendered assistance to Herzfeld who, as is pointed out above, worked on the preparation of United States patent applications corresponding to the Italian applications U-59 and U-63, in that she was available to answer questions about Patent Office practice and similar questions. Mrs. Peake testified that she recalled that the question arose as to whether Pino and Mazzanti, coworkers of Natta should be named coinventors in the United States applications (Cases I, II and III) which became Serial Nos. 514,097, 514,098 and 514,099.

Mrs. Peake testified that she recalled that this question arose on May 26, 1955, and identified certain exhibits as cables and letters which had, in May 1955, been sent to or received from Montecatini which relate to the inventors to be named on the cases filed in the United States.

BX-68, dated May 26, 1955, was identified by Mrs. Peake as a cable sent to Montecatini at the direction of Toulmin. This cable states "in view of your cable suggest make case one joint as in cases II III comma claim priority of U-59 and U-63 stop nomination inventors in Italian applications can be explained if necessary." Mrs. Peake stated that Toulmin explained to her that there was no requirement to name any individual as an inventor in Italy. The cable referred to in the above-mentioned exhibit was identified by Mrs. Peake as BX-67, which is also dated May 26, 1955. Mrs. Peake stated (BR-3112 to 3121) that this cable was received in Washington and that she had a telephone conversation about this matter with Toulmin who was in Dayton on that day and that he had dictated the reply (BX-68).

Mrs. Peake testified that Toulmin had reported to her, after a trip to Milan in 1956 at which time he had interrogated separately Natta, Mazzanti and Pino on the matter of inventorship, that as a result of these conferences he was intirely satisfied that they were properly joined as coinventors, even though a published article (NCX-22) describing this polypropylene included other coworkers of Natta as contributors of the article. Mrs. Peake also stated that on a subsequent trip to Milan in the late spring of 1957 Toulmin interviewed, separately and in her presence, Natta, Pino and Mazzanti to "again determine for his own satisfaction that he had been right in her earlier decision that they were joint inventors for all three United States applications," and that Toulmin stated to her (Mrs. Peake) that he was entirely satisfied that these men were properly joined as coinventors. BX-74A includes a transcript of what is stated

to have been an interview between Chini and Toulmin on June 6, 1958 for the purpose of determining whether Chini should be jointed as a coinventor on applications relating to polypropylene. Mrs. Peake testified that Toulmin discussed this interview with her and stated that on the basis of what Chini said himself, he (Toulmin) had decided that there was no basis for moving under Rule 45 to join Chini as a joint inventor.

Mrs. Peake testified (BR-3191 to 3196) that she discussed the fact that Natta's name only appears as the nominated inventor on Italian Patent 535,712 (corresponding to application U-59) with the Primary Examiner in the United States Patent Office and he stated that he was not challenging the oaths of Natta, Mazzanti and Pino. Mrs. Peake also testified (BR-3200 to 3202) that in May 1955, at the request of Toulmin, she asked the Solicitor of the United States Patent Office what the best practice would be and that she explained the situation to him "in the abstract" and that the Solicitor had stated that she could not be guided by the practice in Italy but must conform to United States law and that if there is any possibility that all three belong on the United States application she should include them, that the Patent Office does not challenge a man's oath but that she must be prepared to meet any challenge by an adverse party in case of interference or litigation involving the resulting patent.

The record shows that this apparent discrepancy of inventorship between the Italian priority application (U-59) and the United States application, Serial No. 514,099 (Case III), was the subject of further correspondence between Montecatini and Toulmin and later Mrs. Peake. After Mrs. Peake ended her association with Toulmin in February 1961, prosecution of the Natta et al. United States applications was conducted by Mrs. Peake assisted by Mortimer and Cox, who appear to have been additional counsel. Mrs. Peake identified BX-73 and NCX-23, dated September 25,

1961 and November 22, 1961 respectively, as cables sent by her to Montecatini relating to this question of inventorship and asking for court decisions indicating that the name of the inventor is unimportant or irrelevant under Italian Patent Law. BX-74 and NCX-24 were identified as copies of replies received from Montecatini to the above-mentioned inquiries. Mrs. Peake testified that the discrepancy of inventorship was discussed with Cox and Mortimer and that it was decided that they would take no action and that Natta, Pino and Mazzanti would stand on their oaths in the United States patent applications and claim their priorities and would meet any challenge which might be made to them by adverse parties (BR-3150).

CONCLUSIONS OF LAW

We have considered the entire record presented by the parties bearing on the question of the right of Natta et al. to reply on their Italian priority application filed June 8, 1954 (not just the portions summarized above). We are of the view that under the circumstances here the fact that Natta was the only nominated inventor appearing on the Italian patent which issued on application U-59 cannot be regarded as necessarily leading to the conclusion that this application was not for an invention made by Natta, Pino and Mazzanti jointly. It has not been disputed that Montecatini had the right, under the Italian laws, to file the application in Italy and that the naming of any or all of the actual inventors was optional with them. The record makes it clear that the correct naming of the inventor (or less than all of any joint inventors) in an Italian application or patent has no bearing on the question of whether the application is regularly filed or on the validity of a patent issued thereon.

It is our conclusion that the record presented clearly establishes that the invention of the count which is de-

scribed in Italian application U-59 was, in fact, the joint invention of Natta, Pino and Mazzanti. Both Pino and Mazzanti testified with respect to joint consultations and joint activities with Natta with regard to the production of a polymer as defined in the present count. We find no evidence in the record which indicates that such joint consultations and activities did not take place. As we pointed out above, Chini testified that in the period in question discussions between Pino, Natta and Mazzanti did take place.

Baxter et al. urge that the testimony of Pino and Mazzanti is "tainted by self-interest" and is therefore entitled to little weight due to the fact that they expected to receive substantial bonuses from Montecatini (or from Natta himself). We do not agree. The second part of Article 23 of the Italian code relating to patent (NX-864) provides for the payment of such bonuses and we believe that the testimony of Pino and Mazzanti is consistent with and clearly supported by the remaining portion of the record relating to the question of inventorship on the part of Natta et al. Under these circumstances we cannot hold that the testimony of Pino and Mazzanti is of no probative value merely because they received bonuses which are provided for by the applicable law. However, we must point out that our conclusion that Natta, Pino and Mazzanti are joint inventors is not based entirely on their testimony but on the whole of the record bearing on this question. It is noted that ordinarily the testimony of inventors as to joint inventorship need not be corroborated by third parties, Lemp v. Randall et al., 33 App. D.C. 430, 1909 C.D. 455.

Baxter et al. also rely on the letter written by Natta to deVarda on March 26, 1965 (appearing as NX-644, Tab 3) as evidence that Pino and Mazzanti are not joint inventors of the subject matter of Italian application U-59. As

stated above, in this letter Natta stated that he agreed that Pino's contribution to the inventions of U-59, U-63, and U-73 could be estimated as approximately 10% and Mazzanti's contribution "not to be greater." Although it might be inferred from this letter that Natta considered the contributions of Pino and Mazzanti to these inventions to be relatively small, we do not regard the letter as indicating that it was Natta's conclusion hat neither Pino nor Mazzanti made *any* contribution to the making of the invention set out in Application U-59. It is well settled that the contribution of one join invenor does not have to be as great as that of another; the invention is joint if each makes some original contribution, though partial, to the invention, Monsanto Co. v. Kemp, 269 Fed. Supp. 818, 154 USPQ 259, and cases cited therein, and Altoona Publix Theaters v. American Tri-Egron Corp. 72 F(2) 53; 22 USPQ 8.

Although under Article 7 of the Italian Code relating to patents (NX-864) an inventor retains his right to be named as an inventor on an Italian patent issuing for an invention made by him (including a joint invention) the testimony of Pino and Mazzanti clearly establishes that they waived this privilege in the case of the first application (and resulting patent) on the subject matter of this interference and were willing that Natta be the only nominated inventor on the patent. Pino and Mazzanti did, however, desire that their names appear as inventors on subsequent applications and patents directed to this subject matter (including Italian application U-63) and in published scientific articles.

We do not find that the fact that the first experiment involving the use of the "Ziegler" catalyst for polymerizing propylene was carried out by Chini can be considered as establishing that Natta, Pino and Mazzanti are not the joint inventors. It is clear that Chini was merely carrying out experimental work as directed and assigned by Natta.

Appendix C

There is no requirement that the inventors must personally carry out the experimental work in connection with an invention conceived by them in order to be regarded inventors. We do not consider any of the testimony of Chini as indicating that Pino and Mazzanti were not joint inventors, particularly since Chini himself admitted that there were discussions about the preparation of this polymer involving Natta, Pino and Mazzanti at which he was not present and in fact he could not remember whether he was present at any of these conferences. It is noted that the record shows that Mazzanti did (subsequent to the first experiment) participate in the experimental work along with Chini and Longi, in addition to consulting with Pino and Natta with regard to the preparation of a polymer as defined by the count. We conclude that there is no basis in the record for holding that Chini should be designated as a joint inventor. The record shows that he was never so considered at Montecatini and application U-59 cannot be said to have been filed on his behalf.

We do not find anything in the testimony of Corradini which could be regarded as estiblishing that Pino and Mazzanti are not joint inventors of the subject matter of application U-59. Corradini was an assistant in the laboratories of the Polytechnic Institute of which Natta was the Director, and his duties included running X-ray studies. In our view the record shows merely that he was carrying out routine duties when he made the X-ray examinations of polypropylene produced at the institute and he stated that at least on one occasion he reported results directly to Natta and that he discussed the structure of the polymer with Natta, Pino and Mazzanti (NR-2571, 2572, 2584, and 2616). It is our conclusion that Corradini and Chini were both working under the direction and instruction of Natta and/or Pino and Mazzanti and may be regarded as their agents in carrying out laboratory work and X-ray measurements.

Appendix C

We do not regard that the naming of Natta as the inventor on Spanish, Mexican or other foreign patents corresponding to Italian application U-59 as evidence that the invention is not joint as is urged by Baxter et al. There is no evidence in the record that Spain, Mexico or any of the other involved foreign countries require that the actual inventors be named. It is clear to us that the nominated inventor in the Italian patent was merely carried over into these foreign patents and this fact does not evidence any assertion by Montecatini that Natta was the sole inventor. It is noted that, when it was decided to file an application in the United States corresponding to application U-59, Pirani, through discussions with Natta, Pino and Mazzanti, determined that they were in fact the joint inventors of this subject matter and Natta, Pino and Mazzanti submitted oaths that they were joint inventors on filing of the involved application and again on filing their preliminary statement.

Baxter et al. have referred to a number of exhibits which refer to Natta as the sole inventor which, they urge, demonstrates that Montecatini consistently asserted that Natta was the sole inventor and hence has denied that Pino and Mazzanti can properly be regarded as joint inventors of the subject matter of application U-59. A consideration of the record reveals that there was a question at Montecatini as to whether Ziegler should be regarded as a joint inventor in view of the fact that the catalyst used at Montecatini to polymerize propylene had previously been used by Ziegler to polymerize ethylene and information as to the catalyst had been obtained by Natta and Montecatini from Ziegler. The record further shows that there was an agreement between Ziegler and Montecatini with respect to inventions made in the field of polymers.

It is clear to us that the reference to Natta as sole inventor in the documents in question referred to the

fact that the invention was not made jointly with Ziegler and did not exclude Natta's coworkers Pino and Mazzanti as joint inventors with him. It is noted that, for example, BCX-47 and BCX-49, refer to Profesor Natta as being the inventor but Pirani testified (NR-3685, 3700-3702) that this refered to Natta and his coworkers and he so understood it in this way. It is noted that these exhibits are dated in 1957 which was long after the date of filing of the United States applications naming Natta, Pino and Mazzanti as joint inventors and long after Pirani's investigation of the question of joint inventorship.

DeVarda similarly testified (NR-5269 to 5273) that the reference to Natta as being the inventor or to "the inventor" in BCX-61A, BCX-62, BCX-63 and BCX-67, (all dated after the United States applications had been filed) was understood to mean the Italian inventors Natta, Pino and Mazzanti. In view of the foregoing we agree with Natta et al. that the documents relied on by Baxter et al., when considered in the light of the entire record, cannot be regarded as establishing that Montecatini asserted that Pino and Mazzanti were not joint inventors with Natta of the invention of application U-59.

Reference has been made to the fact that it appears that no effort was made to add the names of Pino and Mazzanti to application U-59 (or the patent issuing thereon) even though it is stated in BX-70 that "There will be no difficulty in adding the names of the two inventors in the Italian application." We conclude that the failure to so add the above names is not material to the right of Natta et al. to rely on the filing date of application U-59 as, under the Italian law, the correct naming of the inventors is not essential and has no bearing on the question of whether or not the application is directed to a joint invention of Natta, Pino and Mazzanti. Under these circumstances there was no need to add these names.

Nor do we find anything in the testimony of Mrs. Peake which indicates that the invention was not the joint invention of the above named inventors. She testified that she was present when Toulmin interviewed Natta, Pino and Mazzanti in order to satisfy himself on this score when (subsequent to the filing of the United States applications) there was some indication that Chini was asserting that he should be considered an inventor. Mrs. Peake's testimony indicates that the question of proper joinder of inventors was considered and the attorneys were cognizant of the apparent discrepancy of inventorship between application U-59 and the United States application and were prepared to meet any challenge to the motion to shift the burden of proof brought in this interference on that ground and that she had orally consulted certain officials in the United States Patent Office on this question.

Baxter et al. have called our attention to our holding in Interference No. 90,833 and refers to it as being "dispositive of the question of entitlement of Natta et al. to the June 8, 1954 Italian application." We do not agree. As pointed out on page 77 of the Baxter et al. principal brief, in our decision in that interference we stated that Natta et al. had offered no evidence to resolve the inconsistency appearing in the record there. Here, on the other hand, such evidence has been offered and we find that this evidence is sufficient to eliminate any apparent discrepancy. Each case must be decided on the basis of the record presented in that case.

For the above reasons we conclude that Italian application U-59 filed on June 8, 1954 was filed by Montecatini as assignee of Natta, Pino and Mazzanti the joint inventors of the invention described in that application. That this Italian application discloses the subject matter of the count has not been questioned and there is no al-

legation that Natta et al. have failed to comply with the other requirements of 35 U.S.C. 119. We hold, therefore, that Natta et al. are entitled to the date of June 8, 1954 for conception and constructive reduction to practice.

Since we have found that Natta et al. are entitled to the benefit of the filing date of Italian application U-59, the question of their right to rely on the filing date of Italian application U-63 (July 27, 1954) is moot and will not be discussed further.

CASE FOR HOGAN ET AL.

A. *Support for the count in Hogan et al. application S. N. 333,576 filed January 27, 1953*

The Primary Examiner denied the motion of Hogan et al. to shift the burden of proof in view of the application of Hogan et al. set forth above. At final hearing Hogan et al. urge that they are entitled to the date of January 27, 1953, the filing date of their application S.N. 333,576 for constructive reduction to practice.

On page 2 of this 1953 application, it is stated that an object of the invention is "to provide novel polymers of high molecular weight from 1-olefins of the character described." Propylene is a 1-olefin and page 3, line 18, refers specifically to polypropylene. This page shows the production of polypropylene containing a fraction constituting 10 to 20 percent of material boiling below 900°F, which fraction is is described as a tacky polymer containing both semian oil and a fraction above 900°F. This latter fraction solid and solid polymer. "The tacky polymer is semi-solid polymer soluble in pentane at room temperature and may be extracted in this manner, leaving a solid polymer fraction which is insoluble in pentane at room temperature." Hogan et al. assert that this solid fraction is the material of the count.

Appendix C

On page 4, lines 4, 5 it is stated "The solid polymers and copolymers of the invention have utility in applications where any of the solid plastics are used."

Each of Examples I to XIV (pages 9-23) deals with polypropylene produced by polymerization of propylene over the chromium oxide on silica-alumina catalyst and Examples IX, X, XI and XII pages 17-22) show polypropylene fractions which are insoluble in methyl isobutyl ketone at 200°F., the separation of the solid fractions of the polymerized alpha olefins being described on page 29.

Pages 30 and 31 of the Hogan et al. 1953 application contain this general statement as to polypropylene:

> The solid material has a melting point in the range of 240 to 300°F., a density in the range of 0.90 to 0.95, an intrinsic viscosity in the range of 0.2 to 1.0, and a weight average molecular weight in the range of approximately 5,000 to 20,000.

The paragraph following the above contains a description of "The polyethylene of the invention," including the melting point. The last sentence of the paragraph it:

> The melting point was determined from a cooling curve of temperature vs. time.
> This was the melting point of the polyethylene.

The two original claims drawn to solid polypropylene described it, in claim 31, in terms of the process of making and by the characteristics set forth above and, in claim 33, by saying that "the major portion of the unsaturation is transinternal and vinyl."

It is to be noted that no specific method is set forth in the application for preparing the solid polypropylene described on pages 30 and 31. Support for the count has not been challenged in the Hogan et al. 1956 application in the

interference. But none of the examples in the 1953 application have been carried through to the Hogan et al. 1956 application.

No mention is found in the Hogan et al. 1953 application that the polypropylene has "a substantial crystalline polypropylene content." Neither is any mention there found that the solid polypropylene fraction consists essentially of "recurring propylene units."

A letter from Natta et al. to the editor of the *Journal of the American Chemical Society* which appeared in the March 1955 issue (NCX-22) gave information relating to the interpretation of infrared spectra of products within the scope of the count. This could have been known to members of the Phillips infrared group.

In late November and early December of 1955 Reynolds visited Prof. Natta in Milan and became acquainted with Natta, Pino and others (NX-62, 63, 173).

Subsequent to Reynolds' return on December 22, 1955, an X-ray diffraction pattern HX-190 was obtained by Lester Wilson under Gregg's direction on the retained sample of the 1951 product SM-51-2537 (HR-3855-6).

Shortly after January 1, 1956 Cade was directed by Quigg to proceed forthwith in the urgent filing of a product application describing and claiming normally solid polypropylenes within the scope of the interference count (NR-177-8). The resulting application that was filed was the Hogan and Banks application in interference S.N. 558,530 on January 11, 1956.

Hogan et al. rely on the testimony of Dr. Gregg for their assertion that the Hogan et al. 1953 application supports the count. Gregg testified that the melting point range of 240 to 300°F. (HR-3859-3860) for the solid propylene, pages 30-31 of the Hogan et al. 1953 application, implied to him that the sample was crystalline with a substantial amount of crystallinity. Gregg also referred to the para-

graph of the Hogan et al. application following the polypropylene description which paragraph is concerned with polyethylene and which paragraph in the last sentence thereof, which was quoted above, states that the melting point of the polyethylene was determined from a cooling curve of temperature versus time.

Gregg stated that the melting point range for polypropylene in the Hogan et al. 1953 application was determined by the cooling curve method mentioned above (HR-3861). He testified that in determining the melting point in this manner in general the cooling curve would be a smooth curve. However, if the material is crystalline, there will be a break in this smooth curve as it goes through a transition from liquid to solid. It may form a more or less horizontal plateau. Cooling of a noncrystalline material would show a smooth decline in temperature with no observed halts of any kind in the curve (HR-3862).

Gregg in making his statements as to crystallinity based on the melting point referred to these references:

Getman and Daniels, *Outlines of Theoretical Chemistry*, Sixth Edition, (1937), Chapter IV-Crystals. (HX-225)

Baker and Fuller article *Thermal Evidence of Crystallinity in Linear Polymers* (HX-226)

Beaman article (1952) (HX-227)

Physical Methods of Organic Chemistry (1945) (HX-228)

Gregg also testified that his finding of a disclosure of crystallinity of solid polymer fractions of propylene polymer in the Hogan et al. 1953 application was based on the product characterization of a density in the range of 0.90 to 0.95 which he stated is much higher than other polypropylenes which are described in this same application on page 27 in the Table XXII. He stated that in crystalline

materials the molecules are arranged in a regular order. With very few exceptions, this allows the molecules to be packed more closely than in any other arrangement and, hence leads to a high density (HR-3873, 3874).

Gregg referred to an article by Danusso et al. of Montecatini published in 1959 (HX's-229, 229A), as stating that the specific volume which is the reciprocal of density is used in the determination of the degree of crystallinity of some olefinic polymers such as polypropylenes (HR-3874-3877).

Gregg testified that in the course of his work he had determined the density and crystallinity of a large number of solid polypropylenes and that he had never in his work observed or tested a solid polypropylene having a density of 0.90 or higher which did not exhibit substantial crystallinity (HR-3877).

According to the testimony with respect to Example IX of the Hogan et al. 1953 application, Witt in 1963 duplicated the third run of Table XI (page 18, line 12) and Example X as to the first run in Table XII (page 19) according to the instructions of Example IX. In 1965 DeLap repeated the third run of Table XI in Example IX (the first one undertaken by Witt). In each case a product insoluble in methyl isobutyl ketone at 200°F. was recovered. Witt Example IX samples, labeled 11840-26 were reported to have X-ray crystallinity of 46.6 percent and 48.9 percent, Witt Example X sample labeled 11840-63; 54.6 percent X-ray crystallinity and DeLap Example IX sample labeled 13859-18, 51.6 percent X-ray crystallinity.

Infrared spectra for these samples were stated to be that of crystalline polypropylene and to have striking identity with the spectrum of present day commercial polypropylene, the spectra of the polypropylenes obtained in 1951-1952 by Hogan and Banks (contained in the Hogan et al. priority record but not in the 1953 application) and

the spectrum of the polypropylenes of the other parties to this interference (these various spectra being set forth at the end of the Hogan et al. principal brief, Part I).

The following table is stated in the Hogan et al. brief, Part I, page 67, to show the properties of these samples:

	Properties		
Disclosure of 1953 Application p. 30, 1.29 to p. 31, 1.9	Witt Sample 11840-26	Witt Sample 11840-63	DeLap Sample 13859-18
Melting point of 240-300°F. from a cooling curve of temperature vs. time	124.7°C. (257°F.) HR 3259-9, 3263 HX 132, p. 7; HX 133	129.6°C. (266°F.) HR 3266 HX 132, p. 5; HX 134	121.5°C. (251°F HR 3271-4 HX 132, p. 11; HX 136, 137
A density in the range of 0.90 to 0.95	0.9076 HR 3476	0.9099 HR 3466 HX 147, p. 13	0.9117 HR 3490 H 147, p. 32
An intrinsic viscosity in the range of 0.2 to 1.0	0.7 HR 3254-5, 3266-8 HX 132, pp. 8, 9	0.95 HR 3267 HX 132, p. 10	0.68 HR 3282 H 139, 140
A weight average molecular weght in the range of approximately 5,000 to 20,000	Not determined (can be calculated from intrinsic viscosity)	Not determined (can be calculated from intrinsic viscosity)	16,500 HR 3283-4 HX 139, 140
	(Crystallinity) 47% HR 3815-7 HX 195,196	(Crystallinity) 55% HR 3823-6 HX 194, p. 19	(Crystallinity) 51.6% HR 3823-6 H 194, p. 37

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CONCLUSIONS OF LAW

We hold that the Hogan et al. 1953 application, S.N. 333,576, does not support the count. As has been set forth above, there is no reference to crystallinity in the specification. There is likewise no reference to "recurring propylene units" nor any language that would imply that the chemical structure consists essentially of these units.

Nor do we accept the testimony of Gregg taken with the publications to which he referred as establishing that the melting point and density ranges given in the Hogan et al. 1953 application show that the material was crystalline. It is noted that the Hogan et al. witness Nowlin testified (HR-691-693) that one taking melting points cannot determine what fraction of the material is crystalline or non-crystalline absolutely by melting points. It is also noted that the melting point range in the Hogan et al. application, 240 to 300°F., approximately 116°C. to 149°C., is much lower than that of the Natta el al. application, S.N. 514,099, page 12, in the interference of 160° to 170°C. We are not convinced that at the time that the Hogan et al. application was filed, on January 27, 1953, the melting point and density ranges there set forth would indicate the presence of "a substantial crystalline polypropylene content" to one of ordinary skill in the art. It is to be noted that the Hogan et al. witness Frenzl who was in charge of the infrared determination work at Phillips Petroleum testified that he used the term "crystalline" in regard to polypropylene as being solid and rigid (HR-50,51).

Hogan et al. urge that the material that they disclose in their 1953 application consists essentially of recurring propylene units because the application, page 3, line 16, states that the product is produced by the polymerization of propylene and page 33, line 10, stated that "the olefin units are built into large molecules." We do not consider that these two citations support the expression that the poly-

propylene consists essentially of recurring propylene units. At most these portions of the Hogan et al. application go to the making of the product, not what that final product will consist of essentially.

Hogan et al. urge that their 1953 application inherently discloses crystalline polypropylene on the basis of the work in 1963 and 1965 of Witt and DeLap, respectively, allegedly duplicating certain examples of the 1953 application.

The work by Witt and DeLap can be given no weight first because these were *ex parte* experiments conducted during an *inter partes* proceeding. Cislak v. Wagner, 42 CCPA 701, 215 F.(2d) 275, 103 USPQ 39; Electro-Metallurgical Company et al. v. Krupp Nirosta Company, Inc., 122 F.2d 314, 50 USPQ 158. Furthermore, as urged by Baxter et al., this work was *nunc pro tunc*. Such experiments can be given no weight as evidence in view of such cases as Searle v. Glarum et al., 35 CCPA 1106, 179 F.2d 974, 84 USPQ 454 and Heard v. Burton et al., 51 CCPA 1502, 333 F.2d 239, 142 USPQ 97. We are of the view that the evidence here relied upon by Hogan et al. does not establish that the product disclosed in their 1953 application inherently possessed the characteristics required by the counts. Certainly there is no evidence that there was a recognition of these characteristics by them at the time the 1953 application was filed. It further appears that no investigation of the possible presence of crystalline polypropylene was undertaken until those at Phillips became aware of Natta's disclosure of isotactic (crystalline) polypropylene and it appeared that such a product would probably be the subject of a priority contest (NR-177,178). The specification of the Hogan et al. 1953 application does not describe a normally solid polypropylene *consisting essentially of recurring propylene units* or having a *substantial crystalline polypropylene* content.

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In their reply brief for the first time Hogan et al. refer to Natta et al. exhibits which are Du Pont records obtained by discovery from the Du Pont files. These exhibits are NX's 519,593,613,614,767, and 768. As presented in the Hogan et al. reply brief, Eleuterio at Du Pont issued a report on January 11, 1956 (NX-614) that Phillips Petroleum Co., in Belgium Patent 530,617 filed July 23, 1954 and issued January 24, 1955, discloses the use of chromium oxide on silica, alumina or mixtures of the two to prepare polypropylene. The report further states that this patent "discloses" U.S. application S.N. 333,576 (the Hogan et al, first filed case). In another Du Pont report by Eleuterio for April 12, 1956 to December 7, 1956 the report was made that the above Phillips process "makes a polypropylene which is similar to crystalline polypylene made with coordination catalysts." Eleuterio testified (NR-4097-4099) to making such materials, the report (NX-519) setting forth the experimental polymerization and testing alleged to have been performed. An infrared scan was obtained and apparently X-ray diffraction data. The report asserts a crystallinity of 56%. In Du Pont's report of June 12, 1958 (NX-593) it was stated that a material was obtained "which is identical in X-ray diffraction pattern and infrared absorption to isotactic polypropylene."

Since the above matter was brought up for the first time in the Hogan et al. reply brief, we have noted the oral reply to this at final hearing by counsel for Baxter et al. He stated that Eleuterio employed conditions quite different from those of the Hogan et al. application.

There was no fractionation with methyl isobutyl ketone or pentane, as required by the application. Instead, xylene was used. The catalyst used calculates out to 4 percent chromium while the Hogan et al. disclosure prefers 1 to 3 percent.

Also, the Hogan et al. disclosure recites a pressure of 100 to 300 psi at least, with 500 psi preferred, while Eleuterio used 5000 psi.

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Eleuterio used cyclohexane in the feed with the propylene while the Hogan et al. application used isobutane. Also, Eleuterio used a different proportion of propylene in the feed, 80% as compared with 20% in the application. Further, Eleuterio used a shaker tube reaction whereas the application is talking about a fixed bed catalyst experiment. From this, Baxter et al. submit that Eleuterio did not attempt to repeat the teachings of the Hogan et al. application.

That these documents were found in the Du Pont files is not convincing to us that the Hogan et al. 1953 application supports the count. At the beginning and throughout the Eleuterio work, as in that of Witt and DeLap, it was known that a substantially crystalline product was the desired object. The Hogan et al. 1953 appliction, however, says nothing about the product being crystalline. As Baxter et al. have pointed out, the process disclosed by the Hogan et al. application was not that followed by Eleuterio. As to being *nunc pro tunc* experiments, we do not consider the Eleuterio work to be in any better position than that of Witt and DeLap which we have discussed above. Accordingly we do not accept Natta's evidence as corroborating the inherency disclosure of Hogan et al.'s 1953 application and we do not accept the argument that it raises the weight to be given Hogan et al.'s *ex parte* tests set forth above.

The statement on page 4, lines 4 and 5 of the Hogan et al. 1953 application that the solid polymers of the invention have utility in applications where any of the solid plastics are used in inadequate for showing utility for the asserted polypropylene product of the Hogan et al. application. No particular utility is stated for the material. The molecular weight range is asserted to be 5,000 to 20,000. The Phillips Petroleum Research Report (NX-69, page 1) states that a solid polypropylene of "molecular weight of 31,000 . . . was brittle" and that it would be

necesary to have a polypropylene with a molecular weight "in excess of 50,000 to be flexible."

In conclusion, for the reasons above set forth, we hold that the Hogan et al. application S.N. 333,576 does not support the count.

B. *Hogan et al. Priority Proofs*

According to the testimony, Banks had been engaged in the polymerization of propylene to prepare liquid products in the gasoline range with nickel oxide on silica-alumina catalysts (HR-12, 215). Hogan and Banks decided to investigate the effect of adding chromium oxide to this catalyst (HR-12, 13, 215, 216, 802, 803). Banks with some assistance from Hogan prepared the catalyst (HR-12, 48, 22; HX-7, p. 51) and made a propylene polymerization run (4529-79) on June 5, 1951 with a nickel oxide-chromium oxide catalyst supported on silica alumina. This run allegedly produced a solid polypropylene (HR-214-216, 225).

Apparently based on this run, Hogan and Banks, on the same day, turned in a "Patent Idea Record" (HX-1). The material produced was described as "a unique solid material" and as having "a tacky, latex-like nature." Ashe (HR-14, 226, 471-473) testified as to witnessing this document. It is obvious that this material is not "a solid polymer fraction" as described in the Hogan et al. 1953 application which they assert meets the count but the tacky, latex-like material described there which must be further extracted to obtain a solid fraction.

According to the Hogan et al. reply brief, pages 64-82, Hogan et al. now reply for reduction to practice on the following runs:

(1) Polypropylene Gel Run 4721-16 by Francis on October 9, 1951 (HX-3, page 40) Sample labeled SM-51-2537

(2) Pentane Insoluble, Kentone Insoluble Fraction Run 4721-26 by Hogan, Banks and Francis on November 19,20, 1951 (HX-3, pages 53-55)

(3) Sample PO-133 Runs 4958-12, 15, and 18 by Hogan and Banks assisted by Sanbrano and Bodkins in February 1952 (HX-4, pages 18, 19, 24-27, 32, 33)

(4) Sample PO-116 Run 49858-44 by Banks and Hogan assisted by Sanbrano and Bodkins on April 16, 17, 1952 (HX-4, pages 72-75)

In each of the above runs the resulting product of polymerization was produced by those named above respectively and the samples sent on to others for tests. As to (1) and (2) Francis was deceased at the time of taking testimony. In (2), (3) and (4), Hogan and Banks, as is evident, are the inventors. Sanbrano and Bodkins were non-technical men.

In the four runs listed above Hogan et al. assert that the catalyst was chromium oxide on silica-alumina and that the feed was propylene, propane and isopentane in (1) and (2) and propylene, propane and isooctane in (3) and (4).

As to (1) and (2) the evidence as to the asserted polymerizations is contained in the notebook of Francis (HX-3) and the testimony of witnesses asserted to have been present at the time that the work was carried out. Both Hoga nand Banks testified.

The principal corroborating witness is Lanning, who supervised these men in their work. He testified (HR-562):

Q. What was your practice as to following the work done in the building at the research center?

A. Well, it was my practice to spend several hours every day in this laboratory. I had a practice of

talking with essentially all of the men each day, observing what operations were going on. From time to time, discussed the more over-all program, particularly with, such as Mr. Hogan and with others that would be concerned with a given group of experiments. I daily observed what experiments were going on. I, from time to time, actually recorded—not recorded, I actually observed temperatures and pressures and on scanning the notebooks, comparing temperatures, for example, at a given time with how the run generally was going, I knew first hand the experiments that were actually going on, discussed the experiments from time to time with any and all of the technical men there.

Lanning also initiated a Francis progress report (HX-23) dated November 29, 1951 on that day (HR-582-584) and testified as to observing the runs in the Francis Notebook 4721, pages 48 through 55, HX-3. He also testified as to (3) above, (Sample) PO-133, and (4) above, (Sample) PO-116. Lanning's time sheets (HX's-17, 18, 19, 20) also showed the time that he charged in supervising and observing these polymerizations.

In regard to (4) above, sample PO-116, Sanbrano and Bodkins who worked on this run also provided corroboration as to parts of the work.

(1) Polypropylene Gel Run 4721-16

A portion of the product polymerized by Francis was sent to Nowlin who fractionated it and recovered a solid fraction insoluble in both chloroform and benzene. (HX-31). On the exhibit Nowlin has written as the probable composition "$(CH—CH)_{2\ 1M}—CH=CH_{1\quad 2}$ if there were no
$CH_3\ \ CH_3$

cross-linking but there is probably some of both." Also at the bottom of HX-31 Nowlin has written:

The solid insoluble sample designated as SM-51-2537 was sent to Thornton for infrared analysis, to compare with the soluble fraction. Mikkelsen received the sample on October 30, 1951, denominated as "Polypropylene gel" (HX-8, page 6). Mikkelsen ran the infrared spectrum HX-11 on November 26, 1951. Thornton in HX-8, page 54 recorded data concerning the polypropylene gel spectrum.

In a letter to D.C. Smith, dated December 27, 1955 (NX-40) Thornton stated that the sample of "propylene gel" (SM-51-2537) after being stored in a screw capped bottle in the laboratory and box car for four years produced an infrared spectrum identical with the one taken in December 1951 and also identical with that of an "unsoluble" fraction of polypropylene said to have been recently made by the Hydrocarbon Conversion Branch at Phillips.

(2) Pentane Insoluble, Ketone Insoluble Fraction Run 4721-26.

Lanning on November 23, 1951 conveyed personally the sample of Run 4721-26 to Axe in Lube oil (HR-837). Axe in his diary (HX-33) recorded receiving this sample on the same date (HR-944) this sample being a "tacky" propylene polymer sent for V.I. improver valuation.

Axe delivered the polypropylene sample to DeVault (HR-1016-1032; HX-37, page 33) on November 28, 1952. DeVault used methyl isobutyl ketone and pentane to remove the solid material (HR-1020), looking for a V.I. improver. He testified as to the insoluble fraction:

> I assumed that applications of this material could be used in the same way as polyethylene (HR-1032).

Further, he found that it could be molded into a film that was "flexible, not fragile" and that it could be bent to

an angle of 180° without cracking or breaking (HR-1122-1125). On HX-37, page 36, he recorded, on December 4, 1951

> that the material was solid but pliable when molded holds its shape

Axe testified as to the material being useful as a wax modifier, as in canldes (HR-945; HX-33, page 2). The only testing appeared to be candle snapping—the candle broke with a loud snap (HR-946). It does not appear that such candles were burnt. No records were kept of these tests.

A portion of this sample of the pentane insoluble, ketone insoluble fraction of polypropylene was turned over to Thorntons' group. On December 12, 1951 Mikkelsen entered in his notebook 4808 (HX-8, page 6) that the sample was pressed out at 4,000 pounds and 120°C. for approximately 20 minutes and used in making infrared spectrum HX-15 which Thornton included in his July 16, 1952 report (HX-49) as the bottom spectrum in Figure 4. Thornton testified (in 1965) that the major component of the fraction was "crystalline polypropylene of the same structure as the polypropylene gel, sample 51-2537."

(3) Sample PO-133 Runs 4958-12, 15 and 18

Lanning testified (HR-598) that the entire product of runs 4958-12, 15 and 18 was accumulated and given to Axe. (HR-600; HX-21, page 83).

Axe turned the polypropylene over to DeVault who confirmed that this material "was obtained from Dr. Lanning's group." A large quantity was fractionated by DeVault and Gragson with pentane and a mixture of methyl isobutyl ketone and toluene (HR-1041-1065,1227-1230; HX-37, pages 98-100; HX-38, pages 1, 2).

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DeVault testified as to recalling the preparation and shipment of polypropylene samples to the Moore and Munger Company on April 1, 1952. These samples, insoluble at 75°F. in normal pentane, were 4495-99A (OSS 11228) insoluble at 200°F. in methyl isobutyl ketone and 4495-99B (OSS 11 229) soluble in methyl isobutyl ketone at 200°F. but insoluble at 75°F. DeVault testified that prior to March 21, 1952 he found that the addition of 3 percent of sample 4495-99A to wax increased the melting point of the wax from 128°F. to 180°F., a 52°F. increase, whereas two samples of polyethylene gave only a 10°F. increase (HR-1062-1065; HX-37, inside back cover of Notebook 4495).

Axe wrote to Padgett at Moore and Munger that both polypropylene samples appeared to modify wax as evidenced by increased opacity and by qualitative breaking tests of molded samples (HX-34). Padgett wrote to Axe May 8, 1952 that sample 4495-99A would because of its "high hardness" have "certain limited applications in special fields" (HX-35, page 2). From a subsequent telephone conversation with Padgett, Axe learned that the 4495-99A sample was as good as polyethylene as a modifier for waxed paper and that waxes modified with the solid polypropylene were of lower viscosity than polyethylene modified waxes (HR-953, 954; HX-36). Axe testified that he concluded that the solid polypropylene modified the wax "in a favorable way" (HR-970) and that the two letters (HX-35 and HX-36) "indicate the great promise of this material as a wax modifier."

Testing was done on the 4495-99A material by Gallaugher in December of 1952. He recorded the sample as PO-133 (the 133d sample of the year) on December 10, 1952 in his notebook HX-51 (HR-2059-2060). He determined the density to be 0.914 and the melting point to be 236 ± 5°F. on December 19, 1952 (HX-52; HR-2059).

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(4) Sample PO-116 Run 4958-44

One pound of product recovered from run 4958-44 (HX-4, page 74) was delivered to Jones, head of the plastics evaluation group, prior to May 7, 1952. A letter (HX-29) Clark to Reynolds, Director of Research, refers to this sample. Lanning identified the letter (HR-607).

In the fall of 1952 Sanbrano under Hogan's supervision vacuum distilled and fractionated portions of polypropylene from the 4958-44 sample (HX-5, pages 77, 78, 80, 91) in October and November 1952.

Gallaugher on November 17, 1952 logged in a sample of polypropylene from the above run (HR-2058-2059; HX-51, page 14). He made the freezing point determination of 267°F. ± 5 on November 21, 1952 observing a plateau at 267° and ± 5 is the value on each side of the center of the plateau. He made density determinations of 0.906 and 0.907 (HX-51, page 23; HR-2058, 2059, 2064, 2065, 2069, 2070, 2071).

According to the argument of Hogan et al. these melting point and density determinations established crystallinity in the material (The reply brief of Hogan et al., page 82).

At Thornton's request samples of the total polymer product of 4958-44 together with samples of methyl isobutyl ketone-soluble and insoluble fractions were submitted to the infrared laboratory for analysis. Mrs. Buell prepared HX's 40-45 from 4958-44, PO-116. Infrared spectra HX's 40 and 41 of the methyl isobutyl ketone insoluble portion were obtained.

Thornton testified that in his study of these two spectra he concluded that they were the same, spectrum of the same, material as discussed in the Thornton report as polypropylene gel, HX-49.

Later Tests

While in their reply brief Hogan et al. do not describe specifically what they term their "Post-invention analytical

tests," on page 97 thereof they still assert their reliance on these for "corroboration," which tests are set forth on pages 29-31, 34-35, and 43-44 of the main brief, part 1.

Silas, an infrared spectoscopist in Thornton's group, requested in December 1955 and in October 1958 the preparation of two spectra (HX-141 and 142) on a retained sample of the polypropylene gel, SM-51-2537 (HR-3377-3380). Silas testified that these spectra and the 1951 spectrum (HX-11) of this same sample, SM-51-2537, were all spectra of crystalline polypropylene (HR-3407-3421).

In 1959 Gregg evaluated an X-ray diffraction pattern of the retained polypropylene sample SM-51-2537 (Run 4721-16) prepared by Lester Wilson in December 1955 (HX-190) and determined that the sample had a crystallinity of 61 percent (HR-3851-3852).

Silas testified in 1965 as to HX-15, the infrared spectrum of the pentane insoluble, ketone insoluble fraction made by Mikkelsen in 1951, that there was evidence for the presence of all the polypropylene absorption bands which he used in characterizing a commercial crystalline polypropylene, "Profax" (HR-3421-3422), which Silas had run on 10-19-58 (HR-3404).

Gregg testified as to an X-ray scan (HX-191) made by Lester Wilson in 1959, said to be of the pentane insoluble, ketone insoluble fraction and calculated that the crystallinity value was 35 percent (HR-3848-3849).

Silas testified that the spectrum HX-41 of the methyl isobutyl ketone insoluble fraction of run 4958-44 made by Mrs. Buell on 11-26-52 was that of crystalline polypropylene (HR-3439-3439). He stated that this conclusion was based on his own experience and on analysis of the spectrum in the light of certain absorption bands ascribed to crystalline polypropylene in the literature, particularly a 1961 article by Majer, HX-144.

Thornton wrote a report entitled *Infrared Study of Olefin Polymers* issued July 16, 1952 (HX-49). This report has

been referred to above, as in regard to sample SM-51-2537 from run 4721-16 (the propylene gel run) and also in regard to the pentane-insoluble, ketone insoluble fraction (run 4721-26). The summary on the first page states:

> For polymerized propylene, the spectrum obtained was not exactly that expected for a simple head-to-tail polymer. Further work on polypropylene fractions has revealed spectral differences over and above those which can be attributed to molecular weight. These differences are due in part to oxidation, possibly to unsaturation and to the presence of structural arrangements not yet determined. These results indicate that this method of polymerization does not yield a structurally "pure" propylene polymer and suggest that (sic) the need for further investigation of the structural homogeneity of higher olefin polymers.

On page 8 the statement is made (based on Fig. 2, the infrared spectra obtained on sample 51-2537):

> Since we have eliminated the possibility of the structure R— C—C —R as the prominent one and
>
> $$\begin{array}{c} \\ | \\ \mathrm{C}_{\,n} \end{array}$$
>
> a highly branched molecule is indicated (absence of bands at 12.7-13.9 microns), then the spectrum of the gel portion must indicate a pattern of branching.

CONCLUSIONS OF LAW

Hogan et al. urge that they are entitled to dates of four runs identified below carried out in the period from October 9, 1951 to April 17, 1952 as reductions to practice. In view of the fact that Hogan et al. do not urge that they are entitled to prevail on the basis of a first conception coupled with reasonable diligence from just prior to their opponents' entry into the field until a later reduction to

practice, it is not necessary to discuss either conception or diligence on the part of Hogan et al.

The count in this interference is for a product described in terms of its physical and chemical properties, without any reference to a process or any step of a process. What is required of the party Hogan et al. for proof of reduction to practice is evidence showing that in the 1951-52 period, Hogan et al. actually prepared solid polypropylene as defined in the count, that is, one that consisted essentially of recurring propylene units and that it had a substantial crystalline polypropylene content, and that it was so recognized by those at Phillips at that time.

Hence the Hogan et al. record to establish priority need not be as though the invention in issue covered a process or a product by process and prove every detail of the preparation. Whether the products obtained by Hogan et al. in the 1951-52 period responded to the count and were then so recognized is the question at issue.

Accordingly, we hold the record of Hogan et al. is sufficient to show that in each of the runs relied on by Hogan et al. a propylene polymerization product was obtained by the work of Francis in (1), Hogan, Banks and Francis in (2), and Hogan and Banks in (3) and (4). We have pointed out above, this is corroborated by Lanning as set forth by Hogan et al. While we recognize that Francis was deceased at the time of taking testimony and that Hogan and Banks are the inventors in the case, we think that the evidence with respect to carrying out the above runs in adequate for the reasons set forth above. However, it is the products asserted to have been obtained by Francis, Hogan and Banks that must be proved to meet the terms of the count.

(1) Propylene Gel Run 4721-16

In regard to the sample from the above run, Nowlin who performed the fractionation wrote on HX-31 in 1951

that there was probably branching or cross-linking. He testified (HR-681) that at the time he referred to this material as a gel which meant that it could be a cross-linked material. Since Nowlin believed that the polypropylene gel was probably a cross-linked material, he did not believe that it had a crystalline structure or that it consisted essentially of recurring propylene units. In fact, Nowlin testified (HR-770) that he did not know the composition of it, the structure, when he left Phillips Petroleum in 1955.

There is no contemporaneous evidence to show that at Phillips Petroleum in 1951-52 the infrared spectrum HX-11 prepared by Mikkelsen showed crystallinity and recurring propylene units in the sample from run 4721-16.

(2) Pentane Insoluble, Ketone Insoluble Fraction Run 4721-26

With this material DeVault made the fractionations and testified as to making a film that could be bent to an angle of 180° without cracking or breaking. However there was no demonstration by Hogan et al. that the DeVault film had any practical utility. While Axe testified that the material "is high melting and can be cast into transparent sheets" there is no evidence that the latter were actually made or what they would be used for. Nor is there evidence of tests as to this sample to support his remark that "this sample may be a wax modifier." Accordingly, as to this sample, utility remains unproven.

The Mikkelsen infrared spectrum HX-15 was not recognized at Phillips Petroleum at this time (1951-52) as showing that the material consisted essentially of recurring propylene units and had a substantial crystalline polypropylene content.

Hogan et al. have referred to Thornton and Mikkelsen's report of July 16, 1952 on *Infrared Study of Olefin Pol-*

ymers. On Page 8, in referring to the propylene gel sample (51-2537) the report concludes "the spectrum of the gel portion must indicate a pattern of branching." Furthermore, the report, on the cover sheet, stated:

> For polymerized polypropylene, the spectrum obtained was not exactly that expected for a simple head-to-tail polymer.

Thornton also testified (HR-1854) that in the period up to 1952 he classified the polymer of Fig. 4, HX-49, polypropylene gel sample, 51-2537 as not a simple head-to-tail polymer. For all these reasons, we hold that HX-49 does not support a conclusion that the materials of which the infrared spectra were studied therein, the propylene gel sample 51-2537 and the pentane insoluble, ketone insoluble fraction run 4721-26 consist essentially of recurring propylene units and have a substantial crystalline polypropylene content.

(3) Sample PO-133 Runs 4958-12, 15 and 18

This sample was set forth by Hogan et al. in connection with demonstrating utility for this product. We are not satisfied that utility was demonstrated in any test such that it could be said that there was reduction to practice. DeVault in an experiment determined that the material increased the melting point of wax. The result of sanding samples to Moore and Munger did not produce any really positive results according to Padgett's communication to Axe. Axe's report of a telephone conversation with Padgett, that the latter said that the least soluble sample was as good as polyethylene as a modifier for waxed paper and that such modified waxes were of lower viscosity than polyethylene waxes was clearly hearsay and is not given any evidentiary weight. Further, there are no documentary records setting forth what these tests were. Accordingly,

we are unable to ascribe any utility to sample PO-133 runs 4958-12, 15 and 18.

We find no basis in the Gallaugher density and melting point determinations on this sample for concluding that this material had a substantial crystalline polypropylene content. That what he determined as the density of the material (0.914) is within the range of the crystalline polypropylene of Natta et al. does not establish that the Hogan et al. material was crystalline. That Gallaugher determined a melting point for this material does not establish that he Hogan et al. material is crystalline. It is to be noted that the melting point was much lower than that of the crystalline polypropylene of Natta et al. Natta et al. refer to exhibits obtained by discovery at Phillips, NX-313, page 8, NX-313A, page 20, sample CG 6868-34 and NX-149, page 72, sample CG 6868-34A as showing heptane-insoluble and therefore crystalline polypropylene which would not melt at 300°F. or on which no melting point was found. In regard to Gallaugher's "plateau," Natta et al. also refer to NX-312, page 42 (sample CG 6868-42) taken with NX-149A and NX-312, page 47 (sample CG 6868-46A) taken with NX-149A, page 77, as showing heptane-insoluble (allegedly crystalline) polypropylene that was found to have "no plateau" as to the melting point done by Gallaugher. There is no showing by the party Hogan et al. that in the 1952 period and immediately thereafter, prior to the Natta et al. effective filing date, from the Gallaugher density and melting point the party Hogan et al. recognized at that time that the material was crystalline.

(4) Sample PO-116 Run 4958-44

For the same reasons as were set forth above for sample PO-133 we do not accept the Gallaugher determinations of densities and melting point as showing that the PO-116 material was crystalline.

Appendix C

Mrs. Buell prepared two spectra, HX's-40 and 41 from the methyl isobutyl ketone-insoluble fraction of run 4958-44. Frenzel evaluated these espectra and testified (HR 1398):

Q. Did you have at that time the spectrum of a polypropylene homopolymer?

A. I had the spectrum of a homopolymer of propylene which was rigid and had other physical properties characteristic of solid, as opposed to liquid or amorphous materials.

Q. To which spectrum are you referring, if you can tell us?

A. Exhibits 41 and 40, Spectra No. 965 and 959. I had also observed other rigid polypropylenes prior to these dates.

Q. Did you, or did you not, consider the rigid solid polypropylene, of which you have just identified the spectra as Exhibits 40 and 41, to be crystalline?

A. Yes, I referred to the solid rigid polypropylene as being crystalline material.

It is thus apparent that Frenzel considered the material, whose spectra appears in HX's-40 and 41, to be crystalline merely because it was solid and rigid. Such is not the crystallinity of the polypropylene of the count. From his own testimony it is evident that Frenzel's evaluation in 1952-53 did not establish that sample PO-116 had the crystallinity required by the count.

Thornton testified that in late 1952 or early 1953 he likewise interpreted HX-40 or 41 to be the spectra of crystalline polypropylene (HR-1637, 1639, 1640). We find no contemporaneous written record to this effect but only the testimony of Thornton in 1965. While he estified (HR-1640) that they were spectra of the same material as discussed in his report as polypropylene gel, HX-49, we have held above that we found no evidence of crystallinity in

HX-49 and that statements made there militated against head-to-tail propylene consisting essentially of recurring propylene units.

We are unable to find any utility for the products of the four runs relied on by Hogan et al. and hence we hold that there was no reduction to practice on the part of Hogan et al. The forming of films such as for the purpose of making infrared scans is not considered a utility for a practical purpose. Nor do we find any utility in the fact that the material maintained the shape of the container in which it had been melted. We have set forth above that there is no showing of utility in the evidence given by Axe and DeVault as to the pentane-insoluble, ketone-insoluble fraction 4721-26 and sample PO-133 runs 4958-12, 15 and 18.

We do not accept the later work of Hogan et al. of infrared and X-ray diffraction analysis, that performed in 1955 and after, as establishing that the Hogan et al. products, the propylene gel run 4721-16, the pentane-insoluble, ketone-insoluble fraction run 4721-26 and sample PO-116 run 4958-44, consisted essentially of recurring propylene units having crystalline polypropylene content. Hogan et al.'s position is that this work corroborates Thornton's 1951-52 interpretations and conclusions as to the polypropylene gel and pentane-insoluble, ketone-insoluble and those of Frenzel and Thornton in 1952-53 of the spectra of the methyl isobutyl ketone-insoluble fraction of run 4958-44. As we have set forth above, we hold that the record submitted by Hogan et al. does not establish that Thornton and Frenzel in the period 1951-53 identified the products of the runs listed as consisting of recurring propylene units having a substantial crystalline polypropylene content. The later analytical work at Phillips Petroleum beginning in 1955 was an attempt to show for the *first time* that the products of the Hogan et al. runs relied on con-

sisted of recurring propylene units and had a substantially crystalline polypropylene content. It is noted that the above-mentioned later work was carried out only after Phillips had knowledge of Natta's work on crystalline polypropylene and it was considered that a priority contest would probably develop. It is well-known that a reduction to practice cannot be established *nunc pro tunc*, Searle v. Glarum, supra. None of these tests is effective to show what was in the mind of the original interpreter at a time contemporaneous with the preparation of the infrared spectrum said to have been reinterpreted. No X-ray diffraction patterns were made at the time of the original work. The numerical values for percentage of crystallinity of the samples set forth by Hogan are based on the later X-ray diffraction patterns. It does not appear that the later tests (1955 and after) for crystallinity applied by Silas and Gregg were known and in use at the time that the Hogan et al. work was done in 1951-53.

For all these reasons, we hold that the record of Hogan et al. does not establish reduction to practice for Hogan et al. prior to the effective filing dates of Zletz, Baxter et al. and Natta et al.

CASE FOR ZLETZ

A. *Support for the count in the Zletz involved application*

Both Baxter et al. and Natta et al. filed timely motions to dissolve the interference with respect to Zletz on the ground that Zletz has no right to make the count because his application does not disclose the polypropylene of the count. In his Decision on Motions (Paper No. 132) the examiner denied the above motions to dissolve. The issue of the support for the count in the Zletz application has been presented at final hearing.

Appendix C

Baxter et al. urge that the Zletz application fails to disclose a product "consisting of essentially of recurring propylene units." On page 11 of the Zletz specification it is disclosed that a more detailed study of the chemical structure of the solid polypropylene produced was made by means of an infrared examination which indicated that the polymer structure included a high methyl group content in which the methyl groups are isolated from each other by one or more methylene groups. The Zletz specification contains a disclosure of a methylene to methyl ratio of 1 or about 1. Since a propylene unit has a methylene to methyl ratio of 1, that a polypropylene consisting essentially of recurring propylene units is contemplated by Zletz as one of the products of his invention. The fact that the Zletz disclosure may be broader in that other products not conforming to the above definition may also be included does not, in our opinion, detract from the definite disclosure of the structure required by the count as pointed out above.

Baxter et al's second point as to the Zletz right to make the count is that the application does not disclose the removal of water formed during the activation of the catalyst, which is shown by the Zletz record to be a feature essential to the production of a solid polypropylene. Baxter et al. state that the record in the Zletz case-in-chief shows that the catalyst was involved in a series of intermittent pressuring with hydrogen followed by depressuring to vacuum and repressuring several times. The purpose of these steps is to remove any water which may be formed on reducing the oxide catalyst with hydrogen.

The Zletz application expressly makes reference to the parent Zletz application which discloses the supported cobalt molybdate catalyst disclosed by Zletz in this application and states (S.N. 223,641, page 10, lines 9-15; Patent No. 2,692,257, column 6, lines 51-60) that it is:

> desirable to minimize or avoid the introduction of oxygen into contact with the catalyst. Water, in the form of steam, has been found to effect an irreversible poisoning of molybdena-alumina catalysts so that they cannot thereafter be reactivated by purging or reducing treatments alone. It is, therefore, very desirable that the introduction of water or materials which produce water in contact with the catalyst in the present process be avoided.

We think that in view of this teaching, one having ordinary skill in the art would remove any water formed in the catalyst system. It is well-known that water is formed by reduction of oxides by hydrogen and that the reduction reaction is promoted by removal of the water which is formed. Nor would any particular skill be required to remove the product of the reduction reaction from the system. It would be quite obvious to do so. In re Folkers, 52 CCPA 1269, 344 F.2d 970, 145 USPQ 390; In re Chilowsky 43 CCPA 775, 229 F.2d 457, 108 USPQ 321.

Natta et al. urge that the Zletz application in the interference does not support the count but at best describes only "normally solid polypropylene."

Both Natta et al. and Baxter et al. also urge that the record for Zletz supports their contention that the Zletz involved application does not support the count and have referred specifically to run AZ-14 and to the fact that the methylene/methyl ratios actually determined by Hopkins on the polypropylene products obtained were substantially higher than about 1 as disclosed in the Zletz application.

We do not regard these criticisms as sufficient reasons for holding that Zletz has no support for the count. First, as pointed out on page 14 of the Zletz principal brief and by counsel for Zletz at final hearing, runs AZ-14 and AZ-20 are not relied on as actual reductions to practice.

Appendix C

With regard to the methylene/methyl ratios as determined by Hopkins the record shows that the method used had originally been developed for polyethylene. In note 3, page 13, of the Zletz brief the statement was quoted from Hopkins that this method "was not suitable for accurately measuring the CH_2/CH_3 ratio in polypropylene (ZR-3262)." This is additionally pointed out in the Zletz reply brief, pages 18 to 22, based on the Hopkins testimony cited above. Counsel for Zletz at final hearing stated that the Hopkins method was not reliable.

We note Natta et al.'s argument that the CH_2/CH_3 ratio disclosed in the Zletz application is in reality a ratio of methylene groups to alkyl side chains containing 1 to 4 carbon atoms (p. 12, 11.3-9 of the application). In our view, however, it is clear that a product in which the side chain is methyl is specifically disclosed.

Natta et al. further regard the Zletz disclosure as being antithetical to the concept of recurring propylene units because of statements about the infrared spectrum on page 11 of the Zletz application in regard to there being olefinic absorptions therein. In Natta et al.'s view these unsaturated groups taken with their witness Krimm's testimony (NR-6349-6368; NX-874) would show that there was somewhat more than one unsaturated group for every two methyl groups. It is to be noted that the Zletz application, page 11, states:

> The olefinic absorptions represent relatively small amounts of unsaturation in the sample of solid polymer from propylene.

Aside from the olefinic absorptions being said by the application to represent "relatively small amounts," Krimm's calculations are based on various assumptions (NR-6356-6367) which have not been established. When asked on cross-examination whether he meant to express any con-

clusion as to the structure of the polymer (having the IR spectrum which is the drawing in the Zletz application), Krimm replied "I did not" (NR-6445). Krimm also testified that he would not be at all surprised to learn that the polymer was shown by X-ray diffraction techniques to be crystalline (NR-6443). Accordingly we do not agree that the Zletz disclosure is antithetical to the concept of "recurring propylene units."

Natta et al. urge that the Zletz application fails to disclose "substantial" "polypropylene" crystallinity. We do not agree that the Zletz application does not disclose substantial polypropylene crystallinity. Page 12 of the Zletz application sets forth the crystallographic constants for the product of run P-1, which based on X-ray data, gives an explicit disclosure of crystal form and dimensions of the unit cell of the crystal. Since this disclosure refers to propylene units, it is clear that this crystallinity is propylene crystallinity, consequent from recurring propylene units. In this connection Natta et al. urge that the cell dimensions, and shape disclosed by Zletz are inaccurate and not consistent with those shown by known products having polypropylene crystallinity and have referred (in a footnote on page 455 of their brief) to a 1955 Natta and Corradini article (NX-470) and a Jones article (HX-232) published in 1964 which relate to various different forms of crystalline isotactic polypropylene. NX-470 gives only certain dimensions as being "proposed" and HX-232 was published long after the filing of the Zletz application, and it appears that crystalline polypropylene may have different forms, differing in dimensions. Further, the count does not specify any particular cell dimensions and we do not regard that it is essential to a constructive reduction to practice that they be ascertained.

Natta et al. urge that the further properties shown in the specification do not uniquely characterize the disclosed

products. Densities, softening temperatures and specific viscosities are mentioned. These properties do not appear in the count. The question is whether the Zletz application discloses a composition coming within the count. Like Baxter et al., Natta et al. charge that the Zletz process disclosure is inadequate. We conclude that from the Zletz disclosure one having ordinary skill in the art would be able to produce the product defined by the count.

Natta et al. urge that the "Figure" (the infrared spectrum) of the Zletz drawing does not inherently support the count. This Figure is the infrared spectrum of the product obtained from the P-1 run of the Zletz application. Zletz points out that this spectrum establishes identity with the products of Natta et al. and Hogan et al. (Zletz reply brief, pages 2, 44). The Natta et al. attack on this infrared spectrum, referring to ZX-108, which is a 1959 report by Doty, and testimony by Doty and Krimm, goes into the question as to whether the Zletz spectrum shows crystallinity of the polymer. It appears from the Zletz brief that this spectrum is relied on only to establish identity with the Natta et al. product. In any event, we are satisfied that the Zletz crystallographic data obtained from the X-ray spectra, as disclosed in the specification, is sufficient to support the crystalline limitation of the count as we have set forth above.

For all hese reasons, we hold that the Zletz application supports the count.

B. Zletz Priority Proofs

Zletz Physical Exhibits Q and T, which exhibits were not found necessary for our decision, were not received.

Zletz, who had been doing work on the polymerization of ethylene with the catalyst reduced molybdenum oxide supported on alumina, on July 18, 1950 outlined further work on page 68 of his notebook (Z Exh. 1) in which he

specifically proposed employment of this catalyst for the polymerization of propylene. L. B. Stevens , a patent advisor signed that on July 19, 1950 he read and understood this disclosure (ZR-810).

On July 21, 1950 Zletz made a further entry at page 72 of his notebook (ZX-1) proposing mixed metal oxides including cobalt oxide in admixture with molybdenum oxide (also referred to as cobalt molybdate) on an alumina support as active catalysts for polymerization of olefins, including propylene. This entry was initiated by J. C. Stauffer, senior patent adviser, on July 21, 1950 (ZR-298).

In a letter to Stauffer, senior patent adviser, dated August 15, 1950 (ZX-5) Zletz wrote:

> I propose to use mixed metallic oxides, one of which is molybdenum oxide, in the presence of an aromatic hydrocarbon, such as benzene, for the polymerization of propylene to a high polymer. The mixed oxide is supported on alumina. Some examples of these metallic oxides which are used with that of molybdenum are one or more of the following, e.g., iron, nickel, cobalt, thorium, chromium and vanadium. The active catalyst is obtained when the mixed supported oxide is reduced with hydrogen at elevated temperatures.
>
> * * *
>
> The mixed oxides supported on alumina are reduced at 400 to 1,000°F., and at a pressure of one atmosphere to 1,000 p.s.i. of hydrogen. The aromatic medium, such as benzene, is then added to the system. Propylene is added at a pressure of 100 to 5,000 p.s.i. The reaction is carried out for 0.1 to 30 or more hours at a temperature of 200° to 600°F. The polymer is then recovered from the reaction mixture by solution in a suitable solvent, such as xylene.
>
> Dr. Zletz also disclosed a continuous polymerization process, and further stated:

> However, high temperature tends to produce low molecular weight polymer. On the other hand, high pressure tends to produce high molecular weight polymer. It therefore becomes necessary, in order to produce the polymer desired, to adjust the temperature and pressure of operation to those levels best adapted for making the particular polymer product.

Stauffer testified as to receiving this disclosure and reading and understanding it on August 15, 1950, the date he had stamped thereon (ZR-293,294).

Zletz testified that he carried out his first propylene run, AZ-14, on August 11, 1950 (ZR-66,67; ZX-1, No. 93) and another run AZ-20 on August 31, 1950 (ZR-97-112; ZX-1, pp. 117-119). Since neither of these runs is relied on by Zletz for reduction to practice they will not be discussed further.

On September 28, 1950 Carmody condusted a propylene polymerization, run EP-34, in the rocker bomb using the reduced cobalt molybdate catalyst disclosed by Zletz (ZR 467-478; ZX-11, p. 44). Carmody testified that in 1950 he studied catalysts for the production of solid polymers from olefins (ZR-360), that Zletz had discovered that better yields of solid polymers could be gotten with molybdenum oxide on alumina shortly after he, Carmody, came to the laboratory, and one of his first assignments was to repeat the Zletz work on the molybdena-alumina catalyst which he did (ZR-361). Carmody testified that because cobalt molybdate showed appreciable activity for polymerization of ethylene to solid polymers and also the fact that Zletz had gotten some small amounts of solid polymers with propylene, that naturally he tried propylene with the cobalt molybdate next and obtained solid polymers from propylene (ZR-362). In run EP-34, 0.7 gm. of solid polymer was obtained by precipitation with methyl ethyl ketone from the

xylene solution poured off the catalyst and from the xylene solution obtained by refluxing the catalyst with boiling xylene (ZR-470-473). In his notebook (ZX-11, p. 44) Carmody described the product as "rubbery, non-tacky." In his testimony (ZR-473) Carmody stated that the product was "a very thin film, fairly flexible. It was not brittle. It was a reasonably good product, in my consideration as being something quite unique from propylene."

Harban's evaluation group determined the specific viscosity of a sample from run EP-34 and found it to be 20,100 X 10^{-5} (ZX-14; ZR-483-484, 936-941). Hopkins prepared infrared scans (ZX's-91, 92 and 93) of the propylene polymer product of run EP-34 in October 1950. He testified that in the spectra of ZX's-91 and 92 he found absorption bands at 8.63, 9.07, 10.05, 10.29, 11.12, 11.85 and 12.35 which, he testified, are characteristic of polypropylene and are not observed in the infrared spectrum of polyethylene (ZR-3199-3201).

The affidavit of Giulio Natta, filed September 13, 1956 in the involved Natta application, avers that the sharp bands appearing in the infrared spectrum of polypropylene at 10.02, 10.28 and 11.89 microns, as well as the less intense bands at 9.05, 11.12 and 12.39 microns are characteristic of crystalline polypropylene.

Professor Doty testified in 1965 that the EP-34 infrared scans of ZX's-91 and 92 have the bands characteristic of crystalline polypropylene in 1,2 head-to-tail enchainment in the stereoregular form, as well as amorphous 1,2 head-to-tail polypropylene (ZR-4000, 4004, 4006). Doty further testified that by Heinen's method the crystallinity of the EP-34 product is 38%, by the Luongo method, 27% and 30% and that any polymethylene structures are an insignificant component (ZR 4001, 4003).

On September 29, 1950 Carmody conducted a propylene polymerization run EP-35 in the rocker bomb using the

cobalt molybdate catalyst which had been activated with hydrogen (ZX-11, p. 45). The solid polymer was recovered as before (ZR-520). Hopkins, prepared an infrared scan (ZX-95) and reported bands at about 8.63, 9.07, 10.05, 11.12, 11.87, and 12.35, almost the same as those of EP-34 (ZR-3213-3214).

Doty testified in 1965 that the EP-35 scans, ZX's-76 and 95, show the product to be 1,2 head-to-tail amorphous polypropylene and 35% crystalline polypropylene by the Heinen method and 34%, 41% by the Luongo method (ZR-4013, 4010). He also testified that there is no evidence of substantial methylene chains (ZR-4013).

Carmody testified that between October 3 and October 10, 1950 he conducted a series of propylene polymerization runs designated EP-37-A,-B and -C in a high pressure flow reactor (ZX-18; ZR-576-577). Since Zletz does not rely on analyses or infrared and X-ray scans from these runs to identify the products, these runs need not be discussed further.

Carmody testified as to BCX-5, his laboratory record of "EP-67-B Propylene, -Gas Phase CoMo04" dated "Mar. 9, 1951" (ZR-742-745, 751-753). This record gives the off-gas analysis for a Carmody propylene polymerization wherein propylene was the sole source of monomer showing that the off-gas contained 22.6% ethylene and 54.3% propylene. This evidence would indicate that the cobalt molybdate catalyst was a disproportionation catalyst which would give rise to the production of polyethylene in the product.

Peters in 1943-1946 worked at Magnolia Petroleum Company in research work. He was aware there of work on very viscous polymers of olefins such as propylene. After that he worked on polymerization of olefins at Standard Oil of Indiana. During the summer of 1950 he became aware of Zletz's work on the polymerization of propylene

using molybdena on alumina as the catalyst (ZR-1148-1154) and had reviewed the data that had been carried out by Dr. Zletz and Dr. Carmody (ZR-1174). Peters commenced run P-1 on April 30, 1953. He reduced the cobalt molybdate catalyst with hydrogen and conducted the polymerization in a rocker bomb at a temperature of 75-79°F. and a pressure of 155-175 p.s.i. (ZX-1-5, 8, 9, 12, 13, 26). He opened the bomb on June 1 and observed that "heavy sticky polymer was all over the catalyst" (ZX-38, p. 8). A fraction (xylene insoluble, cut #1) which formed as a precipitate upon cooling to room temperature a boiling xylene solution of the product weighed 7 gm. (ZX-38, p. 13; ZR-1263, 1264). The density was determined on June 5, 1963 to be 0.9037 (ZX-29; ZR-913-920, 1016). On June 18, 1953 Kaminsky made infrared scan ZX-77 and on February 16, 1954 Hopkins made another infrared scan ZX-100 which appears in the Zletz application (ZR-3253-3256, 2834-28-35, 3256, 2830, 3537).

Doty testified in 1965 from the infrared scan ZX's-77 and 100 that the major constituent of Fraction No. 1 was crystalline head-to-tail 1, 2 polypropylene about 77% by the Heinen method and 95% by the Luongo method together with 1, 2 head-to-tail amorphous polypropylene (ZR-4010, 4013, 4014).

Peters submitted a sample of his Fraction No. 1 for X-ray examination. Kimball, under the supervision of Dr. Ehrhardt, prepared X-ray diffraction patterns ZX's-45 and 47 on September 14, 1953 (ZR-1617, 1639, 2430, 2431). From the same sample Kimball prepared an X-ray diffraction film ZX-48 on the same day and another diffraction pattern ZX-50 on November 16, 1953 (ZR-1689). Kimball testified with respect to ZX-45, the first polypropylene X-ray scan he had run, that he recognized it as a unique diffraction pattern, different from anything he had ever seen before (ZR-1768). Ehrhardt, who was in charge of the X-ray group, testified that he recognized the X-ray

diffraction pattern of ZX-45 as distinctly different from any that he had seen before and regarded it as characteristic of crystalline polypropylene (ZR-2449, 2576).

In collaboration with Ehrhardt, Kimball prepared a report, ZX-41, dated March 19, 1954 for Peters differentiating polyethylene, polypropylene and polyisobutylene on the basis of their X-ray diffraction patterns (ZR-1743). This report stated "the data clearly shows the above polymers to be crystalographically (sic) different." Tentative conclusions were drawn in the report in respect to unit cell dimensions and crystalline habit and it was indicated that the propylene chain is non planar. The Kimball reports ZX's-51 and 57 also deal with this crystallography and the latter Kimball report states that "the hydrocarbon chain is helical in form."

Peters conducted a propylene flow run P-9 (F-P-Xy-Co-$MoA1_2O_3$-9) on July 17, 1953 (ZX-38, pp. 31-39). The cobalt molybdate catalyst was activated with hydrogen as in run P-1. The feed was a mixture of xylene and propylene, the temperature 220°-250°F. and the pressure a maximum of 600 p.s.i. Successive cuts were withdrawn and worked up to recover solid polymer (ZX-38, p. 32-37). Cuts 1-7 were combined and dissolved in boiling xylene. Upon cooling the solution 4.6 gm. of solid polymer was precipitated (cold-xylene-insoluble polymer). The filtrate was treated with acetone and another 4.6 gm. of polymer was precipitated (acetone-insoluble polymer). By distilling off the solvent another 1.6 gm. of polymer was obtained (ZR-1341, 1342). Similar fractions were obtained from combined cuts 8-12 (AR-1334).

Samples of the above polymer were submitted for infrared examination. Infrared scans were made by Kaminski. ZX-16 was made August 26, 1954 (ZR-2811, 2812) on the xylene-insoluble fraction. ZX's-62 made on August 31, 1954 and 63 on September 1, 1954 were made on the acetone-insoluble fraction. Doty testified in 1965 that

ZX-61, the infrared scan of the xylene-insoluble polymer, demonstrated its major constituent to be crystalline head-to-tail 1, 2 polypropylene 70% or 72% by the Luongo method (ZR-4007, 4010, 4014, 4176).

An X-ray diffraction pattern of the above xylene-insoluble material was made by Kimball on September 21, 22, 1953, which is ZX-49 (ZR-1658-1661).

Professor Mark testified that he spent four days in Whiting until December 11, 1953 and a sample of polypropylene was shown to him. It was said that this was a sample which Dr. Peters had made and an X-ray diagram was also shown to him. Mark testified that the "first step" was that solidity of the material was disclosed and the "next step" was that crystallinity was added to the character of solidity. Professor Mark's note in his diary for this occasion stated:

> PP (polypropylene) same of Dr. Peters. X-ray diagrams show crystallinity.

When shown ZX-48 all that Professor Mark could say with confidence was that the film which he saw at that time looked very similar to that one (ZR-3660-3665). Mark testified that on May 25, 1953 he received a polypropylene sample at Whiting. In Brooklyn he prepared a thin film from the sample and ran an X-ray diffraction pattern. The X-ray film was said to show that the material was crystalline with visible amorphous background. He did not make quantitative measurements but reported on his next visit to Whiting on July 28, 1954 that the material was crystalline and high melting (ZR-3673, 3674, 3678-3681). At the time of taking testimony Dr. Mark had searched for the film and was unable to find it. Mark, when shown X-ray diagrams ZX's-45, 47, 49 and 50 could not positively identify these as the exact scans that he had seen on his trips to Whiting in 1953 and 1954 but he did

testify that such Geiger counter tracings were shown him and discussed (ZR-3732, 3733). Work by Mark on another sample given him at Whiting February 24, 1955 and his report of May 9, 1955 will not be discussed since these times are long after the effective filing dates not only of Baxter e tal. and Natta et al. but also of Zletz.

CONCLUSIONS OF LAW

Zletz urges that he is entitled to prevail as being the first to reduce the invention of the count to practice. He relies only on the products of runs EP-34 and EP-35 prepared by Carmody in 1950 and on the products of Peters' runs P-1 and P-9 carried out in 1953. Zletz is not relying on prior conception coupled with reasonable diligence to a reduction to practice. Also, in view of the lack of any proof of diligence by Zletz it is immaterial whether prior conception is established, Clarkson v. Vibber, 52 CCPA 876, 144 USPQ 26, 28.

Hogan et al. take the position that runs EP-34, -35 cannot be credited to Zletz. The argument that Carmody conducted his runs independently without guidance from Zletz's teachings we consider is refuted by his own testimony. He was familiar with the prior work of Zletz and Zletz had previously conceived of the use of the cobalt molybdate catalyst for polymerizing propylene. We find nothing in the joint execution by Carmody and Zletz of the oath in Carmody and Zletz application S.N. 223,642 that leads us to conclude that Zletz should not be considered the sole inventor of the subject matter at issue. Runs EP-34 and 35 by Carmody are properly attributable to the party Zletz. It is well recognized that third party inventorship is not ancillary to priority. Swain et al. v. Mallory, 51 CCPA 1242, 329 F.2d 983, 141 USPQ 208. The Carmody and Zletz application S.N. 223,642 is now

abandoned and does not establish non-joinder as to inventorship as to the Zletz application in interference.

Baxter et al. urge that the use of low temperature and liquid propylene in the polymerization by Peters were features not foreseen by Zletz and Carmody in the process, that Peters made a necessary contribution and that, if there is any invention disclosed, there is misjoinder for failure to include Peters as an inventor. However we regard these matters as within the skill of the art. As pointed out above, the record shows that in 1950 Zletz wrote a letter stating that high temperature tends to produce low molecular weight polymer and that produce the polymer desired, it becomes necessary to adjust the temperature and pressure to those levels best adapted for making the particular polymer product.

Hogan et al., Baxter et al. and Natta et al. urge that the express abandonment of Carmody and Zletz application S.N. 223,642 containing Carmody runs EP-34 and -35 and the omission of these runs from the Zletz application S.N. 462,480 filed October 15, 1954 which is in the interference require the conclusion that these runs were abandoned experiments. We fail to see why the inclusion of a description of runs EP-34 and -35 in an application now abandoned should render them abandoned experiments which cannot be relied on by Zletz for reduction to practice in this interference. No authority has been cited by the opposing parties for this. That Indiana Standard was emphasizing research on ethylene at this time (HRB 53) does not establish abandonment of the Carmody runs with propylene. As stated in the Carmody and Zletz letter of abandonment in S.N. 233,642, abandonment of the application did not constitute abondonment of the invention. Nor do other circumstances at Indiana Standard convince us that these runs were abandoned experiments.

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Hogan et al., Baxter et al. and Natta et al. all point out that the high methylene/methyl ratios determined by Hopkins on the products relied on by Zletz as reductions to practice indicate that these products do not consist essentially of recurring propylene units and hence are not products meeting the terms of the count. As we pointed out above, the record for Zletz shows that it was recognized that the method used by Hopkins for determining this ratio in products made from propylene was inaccurate and unreliable and the Zletz briefs make it clear that he does not rely on these determinations to establish the recurring propylene unit structure of the products.

Zletz relies on the testimony of Doty, taken in 1965 with respect to his interpretation of infrared spectra, for showing the crystallinity of the products of runs EP-34, EP-35, P-1 and P-9. Zletz urges that the Doty testimony is admissible to establish the fact of what the spectra, which are original, contemporaneously made spectra show. Hogan et al. have pointed out that Hopkins and Hannan reported (NX-317) on March 19, 1958 that (with respect to runs EP-34 and EP-35):

> . . . at the time these spectra were made there was no basis on infrared data alone for conclusions concerning the presence or absence of crystalline polypropylene.

It is also pointed out that Evering, who in 1950-51 was the head of the research group in which Zletz and Carmody worked, testified that at that time they did not have any direct evidence of crystallinity (ZR-2714). It is clear to us that the same situation with respect to the conclusions as to the presence of crystalline polypropylene would also apply to the products of runs P-1 and P-9.

It is our view that the Doty testimony cannot be relied on to establish that the products relied on by Zletz con-

tained a substantial crystalline polypropylene content; the fact that these products met this essential limitation recited in the count cannot be established *nunc pro tunc*. It is clear to us that there is no showing that, at the time the infrared scans were produced, or at any date prior to the effective filing dates of Baxter et al. or Natta et al., that these scans showed that the products had a substantial crystalline polypropylene content or that they consisted essentially of recurring propylene units as required by the count. Although it could have been gathered that some polypropylene was present there is no showing that the product *consisted essentially* of recurring propylene units. There was no appreciation or even mention at that time that these infrared scans show crystallinity of the products. See Heard v. Burton et al., 51 CCPA 1502, 333 F.2d 239, 142 USPQ 97.

Zletz further relies on the X-ray spectra of products from Peters runs P-1 and P-9 which spectra were made in 1953. Peters submitted the samples on a personal basis (ZR-1365-1369). Each of the diffraction patterns was made by Kimball and this was done in September 1953 and November 1953 (ZR 1614-1617, 1632-1634, 1642-1645, 1660-1664, 1891, 2449-2453). Baxter et al. concede in their brief, page 198, that X-ray analyses of some of Peter's products showed that they did contain "crystallinity generally of the polypropylene type." However, Kimball's report to Peters on Peter's xylene-insoluble material (ZX-40) stated "% crystallinity determinations on polypropylene cannot be undertaken until a completely oriented sample is submitted for examination." There is no written record of such a Zletz product. No quantitative measure of the proportion of crystallinity in the samples was made. Kimball who ran the X-ray diffraction patterns testified (ZR-1905-1907) that he could not exclude the presence of amorphous ethylene-propylene copolymer and also the presence

of crystalline ethylene-propylene copolymer on the basis of these scans, depending upon the amount. For these reasons, we consider that there was no showing that the products of Peters possessed "a substantial crystalline polypropylene content" and were products "consisting essentially of recurring propylene units."

Professor Mark's testimony cannot be accepted as establishing "a substantial crystalline content" for a party Zletz polypropylene "consisting essentially of propylene units." There was no identification of the sample of polypropylene said to have been made by Peters that was shown him on December 11, 1953. He also stated that an X-ray diagram was shown to him at that time but this was not identified with any Peters run and was not submitted as an exhibit in the Zletz record. The proportion of crystallinity in the sample is not shown by his testimony. His further testimony that he took a sample back to Brooklyn and ran an X-ray diffraction pattern on a thin film of the material without making any quantitative measurements is unaccompanied by any contemporaneous written reports and the diagrams themselves could not be found. This testimony alone is insufficient to convince us that Peters produced a product coming within the count.

Since Zletz has not shown utility for his products we hold that there has been no reduction to practice. We fail to see that the utility of the product of the count would be obvious. According o the assertions of the Zletz brief, page 4, the party Zletz was the first to produce and characterize this material. Since the material was assertedly up to then unknown, that would be true of the uses of the material. There would be no reason that the polypropylene of the count should have the utility of crystalline polyethylene. The party Zletz has been careful to point out that the material he obtained was altogether different from polyethylene and polyisobutylene (ZX-41). No weight can

be given to utility statements in the Carmody and Zletz application S.N. 223,642 filed April 28, 1951 which was expressly abandoned May 20, 1954. Zletz was never given nor did he move for the benefit of any prior application in this interference. The only product claims prosecuted in application S.N. 223,642 were for a normally solid polymer derived from ethylene and propylene. Under all these circumstances Zletz cannot now rely on Carmody and Zletz application S.N. 223,642 for reduction to practice. Nor does the fact that films were made for infrared, X-ray or other testing demonstrate utility for the material. The utility of such films for any useful purpose was never demonstrated. While the Zletz reply brief, page 26, speaks of Hopkins stretching a film to one-half its intial thickness, Hopkins states (ZR-3587-3588):

> I do not have any recollection of the amount of stretching I did of the sample.

Zletz, in footnote 18 to page 27 of his reply brief, refers to ZX-23, page 1 and Table III as to "A 1.0% solution of solid polypropylene in hydromatic oil raised the V.I. (viscosity index) from 87 to 133.5." This exhibit is a report by Carmody dated "5-2-51." There are no laboratory notes and no testimony showing just what was done and the materials used to test the Carmody polypropylene as a V.I. improver. Table III in the exhibit identifies the polypropylene as obtained from EP-37-A. As pointed out above, the product of run EP-37-A was not identified by analysis, by infrared scan or by X-ray scan, so that there is no evidence to show that it falls within the count. In this connection, it is to be noted that in ZX-109 which is page 46 from Carmody's laboratory notebook C-278-15 dated October 5, 1950 (ZR 4300-4305) it was the *oil fraction* from the polymerization of propylene by Carmody in run EP-32 that was shown to be a V.I. improver, not a solid product.

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For the above reasonss we conclude that the party Zletz has failed to prove an actual reduction to practice prior to the effective filing dates of Baxter et al. and Natta et al.

CASE FOR BAXTER ET AL.

A. *Support for the count in the Baxter et al. applications*

The question of support for the count in the involved Baxter et al. application as well as in their prior application, Serial No. 451,064, filed August 19, 1954, was raised during the motion period and is presented for review at final hearing. In the above-mentioned Decision on Motions the examiner held that the present count is supported in both of the above Baxter et al. applications. The examiner held that the count was disclosed in the involved Baxter et al. application because it discloses a solid polypropylene containing a substantial crystalline polypropylene content. With respect to the August 19, 1954 Baxter et al. application, the examiner stated that Example 11 thereof is drawn to a polymer falling within the scope of the count and that the application contains other disclosures of solid partially crystalline polypropylenes. The involved and parent Baxter et al. applications disclose polypropylene containing up to 30% and 25% crystalline content respectively.

We have considered the disclosures in the above Baxter et al. applications in view of all the arguments advanced and we agree with the examiner that the above Baxter et al. applications disclose the subject matter of the count. These applications describe the polypropylene to be 25% and 30% crystalline. It is our view that these amounts of crystalline polypropylene are more than inconsequential amounts, and therefore meet the limitation as to "substantial" crystalline polypropylene content. The fact that the polymer is referred to in the involved Baxter

et al. application as "highly" amorphous cannot be regarded as indicating that the crystalline polypropylene content is not substantial. There is no requirement in the count that the polymer be over 50% crystalline polypropylene, but only that it contain a substantial (more than inconsequential) amount of such crystalline material. It is evident that the crystalline polypropylene content of the polypropylene disclosed by Baxter et al. imparts characteristics which distinguish such polypropylene from prior art polypropylene. We note that the claims directed to polypropylene appearing in Baxter et al. application Serial No. 451,064 were not rejected on prior art but as unpatentable over the counts of this and a related interference and unpatentable over the disclosure in the Baxter et al. application involved in this interference.

We are also of the opinion that the Baxter et al. applications disclose a solid polypropylene consisting essentially of recurring propylene units. We are of the view that the homopolymer of propylene disclosed by Baxter et al. would not have more than slight irregularities in the polymer chain. The polymers are described as having a linear structure.

We conclude that Baxter et al. can make the present count and that they are entitled to the benefit of the filing date of their prior application filed August 19, 1954 under the provisions of 35 U.S.C. 120.

B. Baxter et al. Priority Proofs

The inventors named in the Baxter et al. application were employed in the Exploratory Research Section of the Research Division of the Polychemicals Department at E. I. duPont de Nemours and Co. (Du Pont). Robinson testified that in late 1953 and early 1954 he was a supervisor in the Exploratory Research Section and that one problem they were working on was a "search for new

catalyst systems to polymerize olefins"; that early in 1954 under his supervision Merckling had employed a mixture of aluminum chloride, titanium tetrachloride and aluminum metal as a catalyst in an attempt to copolymerize ethylene and norbornylene; that this experiment resulted in the production of a small amount of polymer and that the polymer looked to him (Robinson) unusual in that it was more rigid than the branched polyethylene that he knew about at that time. Robinson also testified that as a result of this experiment they were encouraged that they "had opened a door to a new kind of polymerization system" and that they devised a research program "to better define the catalyst and to determine if this or related catalyst systems would polymerize other olefins such as propylene, butenes and the like." (BR-11).

Robinson identified BX-4 as a notebook record of certain experiments carried out by Mercklin, beginning about February 10, 1954. These experiments involved attempts to polymerize ethylene and propylene. BX-5 was identified by Robinson as Merckling's notebook record (dated April 6, 1954) of an experiment involving the polymerization of propylene. Robinson testified, and this exhibit shows, that a very small amount of a solid was obtained which was not further investigated "due to insufficient quantity." The record shows that at the time of taking of testimony for Baxter et al. Merckling was deceased.

Subsequent to the above-mentioned activity, further work was carried out in the Exploratory Research Section by Stamatoff and Baxter on the use of "coordination catalysts" for the polymerization of olefins. This is the designation which was given the catalyst combination of titanium tetrachloride (or other heavy metal halide) and a Grignard reagent (BR-221-222). The record shows that starting in May of 1954 Stamatoff carried out a series of experiments in which attempts were made to polymerize and copolymerize various olefins with catalysts made up of

titanium tetrachloride and Grignard reagents or other reagents which would reduce the valence of the titanium. Stamatoff testified that it was a goal to prepare a very active catalyst for the polymerization of ethylene and higher olefins and that they performed most of their experimental work with ethylene as the monomer as they were more familiar with ethylene than with other olefins. BX's-13 and 14 are notebook records of experiments carried out by Stamatoff in the period from April 1954 to August 1954.

Baxter, who reported to Stamatoff, also worked on the polymerization of olefins employing "coordination catalysts." Baxter testified that beginning in the middle April 1954 his assignment became to develop more effective catalysts for the polymerization of ethylene and other olefins and unsaturated compounds and that generally he would "screen with ethylene to determine their activity" and if the catalyst "looked attractive we would try propylene." BX's-17 and 20 are Baxter's notebook records of his experiments in the above area carried out between April 1954 and August 1954. The record shows that Baxter employed catalysts which included halides of metals other than titanium, e.g. zirconium, tungsten etc. in carrying out his polymerization experiments.

It was the practice at Du Pont that polymerization experiments which were to be carried out under super-atmospheric pressure had to be carried out in what was known as the High Pressure Laboratory (HPL) by personnel assigned to that laboratory. The record shows that it was the practice for the chemist initiating the experiment to transmit to the HPL the catalyst to be used and written instructions as to how the experiment was to be carried out and the conditions of the experiment. The olefin to be polymerized was usually available in the HPL and when the experiment was carried out a record of the actual con-

ditions etc. was made, copied into an "HPL notebook" and returned with the product obtained to the chemist who requested that the experiment be run. The HPL was under the supervision of Stephens who testified as to the practice and identified a number of exhibits as the HPL records of experiments carried out on behalf of Stamatoff and Baxter. The persons in the HPL who actually carried out the runs also testified as to the work done and the records made of the experiments.

The record shows that in the period from about April 1954 until the Baxter et al. parent application was filed in August 1954 Stamatoff and Baxter each carried out a large number of experiments in which a number of catalysts were employed in attempting to polymerize ethylene, propylene and other unsaturated compounds. In a fairly large number of these experiments no polymer was obtained, or only liquids or oils or only a trace of solid was obtained. In most of the cases where only small amounts of solid were obtained no analysis or other evaluation of the product was made.

On page 86 of Baxter's notebook No. 4427 (BX-17) is recorded an experiment in which 50 grams of propylene were mixed with a catalyst including titanium tetrachloride and phenylmagnesium bromide. This notebook page indicates that 0.5 gram of the polymer was obtained which was pressed into a film, that this film was tough and elastic and that it was "submitted for IR." The notebook entry is dated May 17, 1954 and was signed by Baxter on May 19, 1954. On page 97 of the same notebook is recorded another experiment involving the use of the same catalyst as set out on page 86 in polymerizing propylene. On this page it is stated that the product was washed in methanol etc. ". . . to give 0.3 g product like 4427-86. Film was same." This notebook page was dated May 19, 1954 and signed by Baxter on 5-20-54.

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Baxter testified as to carrying out the experiment as recorded on page 86 of his notebook No. 4427 and stated that he prepared the catalyst mixture and took it to the HPL and when the "run" was completed his original request form and a paper describing the condtions used with a bottle containing the reaction mixture from the run were returned to him and that the experiment was started on May 17, 1954 and completed by May 19, 1954. Baxter also testified that he pressed the solid material produced into a film about one half inch by one inch and a half by about five mils thick and that he pulled on the film with his fingers and found it tough and a little more elastic than the linear polyethylenes they had been working with.

Baxter further testified that when he obtained the product as described on page 86 of his notebook he showed the product to Anderson. When asked whether Anderson was surprised (at the properties of the product) Baxter replied (BR-690) "I do not really recall what his reaction was." Baxter took this product to Yakubik, later by change of name (and hereafter referred to as) Beck, and asked him to run an infrared scan. Baxter testified that he wanted "confirmation that the material I had made was polypropylene" (BR-693). Baxter stated that he received a report of the infrared scan in the form of a PRAL slip (BX-18) and that Beck had also reported to him orally about the result. BX-18 includes the statement "Band at 8.69 u may be due to isolated internal methyl groups (R-CCC-R)." The above PRAL slip is dated 5/21/54 and

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Baxter stated that he received it (the typed report) on May 21, 1954, and that he concluded from reading the report that "we had made polypropylene." Baxter stated (BR-1028-1031) that no quantitative data as to the methyl absorption shown by the infrared scan of the above sample

had been reported to him or had been discussed by him with anyone, and (BR-1085 and 1130) that he did not recall seeing BX-25 or any infrared scan of a product which he thought was polypropylene prior to signing the oath of the involved Baxter et al. application. Baxter stated that as of May 1954 he had no experience in making interpretations of infrared spectra. Baxter also testified (BR-1030) that he cannot recall making any written record of his conclusion as to the structure of polypropylene he prepared on May 17-19, 1954. BX-21 is a letter from Baxter to Gresham dated June 17, 1954 asserted to be for the purpose of aiding the Patent Section in forming a patent disclosure concerned with the use of coordination catalysts for the homopolymerization and copolymerization of ethylene and substituted ethylenes. On page 2 of this exhibit is a description of the polymerization of propylene carried out by Baxter on May 17-18, 1954. The product is described as "tough and very elastic, d. 0.85, softening point 150°C. A qualitative infrared spectrum showed the presence of a quantity of methyl groups consistent with a polypropylene structure."

Baxter at BR-701 stated that the product made in the experiment on page 86 of his notebook was submitted for X-ray analysis by Beck and that in July 1954 he was informed by Beck as to the results of the X-ray examination which showed that the material was partially crystalline, but that he could not recall that he had seen the X-ray spectrum of this sample, and that he could not recall the specifics of the discussion with Beck.

Stamatoff testified that, although Baxter showed him the product he obtained in May 1954 "rather excitedly," he, Stamatoff, was not excited over the half of gram of polymer produced.

Anderson substantiated Baxter's testimony as to showing him "a sample of what he told me was polypropylene

film" "a month or two after Baxter had left my group" and further stated (BR-2330) that "The properties of the film surprised me." Anderson further stated (BR-2334) that he "had a strong feeling that something had happened in the polymerization . . . I am sure that I considered the possibility that the film was more regular in structure in some fashion, and as a consequence of this greater regularity that it might have some degree of crystallinity." Anderson also stated that he did not consider that there was any proof of crystallinity although there was a "strong suggestion that crystallinity could be present." Anderson stated that it was reported to him that the infrared examination of the polymer had shown a high concentration of methyl groups and that he concluded that the polymer was a "head-to-tail polymer." At BR-2457-2458 Anderson stated that in 1954 he kept an "idea book" or diary but that he did not make any record of having seen a sample of the polymer Baxter showed to him.

The record shows that Anderson prepared a letter to Grigsby dated June 15, 1954 (BX-48) containing information for incorporation into a quarterly report of the Research Division which mentions that exploratory research on new catalyst systems has produced a catalyst of improved activity which "will give high molecular weight, high density polyethylene at room temperature and atmospheric pressure" and that similar catalysts have produced other potentially valuable hydrocarbon polymers and copolymers including polymers from propylene. Anderson also prepared another letter dated June 18, 1954 (BX-49) and addressed to Grigsby and which is stated to include additional items or to elaborate on the same information as was in the previous letter (BX-48). In this letter it is stated "a new method of polymerizing unsaturated hydrocarbons has been discovered. By its use ethylene,

propylene, cyclopentene and norbornylene have been polymerized at very low pressures to high polymers. . . . These polymers and copolymers are all new composition except for polyethylene . . ." Neither of these letters includes any statement as to crystallinity or any other particular structure of the polymerized propylene. Anderson testified (BR-2351 and 2352) that in the statements in BX's-48 and 49 about polymers from propylene he was referring to Baxter's work.

Beck (formerly known as Yakubik) who worked in the Infrared Spectroscopy Group at Du Pont in 1954 testified that he prepared an infrared spectrum (Spectrum No. K6365, BX-25) on a sample designated by Baxter as "polypropylene" and that he wrote the PRAL report (BX-18) which is a report based on the spectrum BX-25. Beck stated further that the value for thickness of the sample and the calculations appearing on the spectrum were placed there at a later date, probably during the summer "as the information in the spectrum of polypropylene became interesting to us in terms of evaluation and characterizing ethylene-propylene copolymers" (BR-1589, 1597). Beck stated that he reported the results of the infrared spectrum by means of the PRAL report and "in addition I would have gotten together with Dr. Baxter to verbally review an interpretation of the significance of the spectrum" (BR-1598).

When questioned about the interpretation of the spectrum (BX-25) and the notations as to the methyl group at about 11.15 microns Beck stated (BR-1596) that they were making some attempt to identify the origin of the various bands in the scan and "I believe my designation of that band as methyl is not confirmatory in any sense, but a suspicions as to that possibility." With respect to the structure indicated and the term "Isolated internal methyl groups" appearing at about 8.65 to 8.70 of the scan Beck

stated that this structure "was suspected as possible in the polymer." The above structure was the same as appearing on the PRAL form, BX-18, prepared by Beck.

At BR-1599 to 1605 Beck testified with respect to his interpretation and conclusions as to spectrum No. K 6365 (BX-25). Beck stated that it was "common practice" to hold a discussion prior to the actual recording of the spectrum and that:

> I think after we ran the spectrum and I had an opportunity to do some preliminary correlation studies . . . I began assigning some possible bands which were characteristic of an absorption one might expect from the structural possibilities. . . .
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> • • •
>
> We concluded that the polymer was consistent with a structure predominantly head to tail. We further observed that the absorption band which appears as a shoulder at between 8.95 and 9 microns could have been due to the adjacent methyl group. . . . This was a possibility.
>
> • • •
>
> I don't think one can conclude unequivocally the presence of this structure from the spectrum as we observed it. . . .
>
> • • •
>
> The two absorption bands at 13.7 and 13.9 are very weak bands. One could suspect that it would be due to polyethylene, but it is unlikely due to the copolymer of polyethylene with polypropylene. . . .
>
> • • •
>
> In this particular case, looking at the spectrum in May of 1954, our suspicion would have been that it was possible to have a small amount of polyethylene but that the structure was predominantly polypropylene consistent with a head-to-tail mechanism.

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In response to a question as to the date when he could suspect that it was unlikely that the bands were due to the presence of the copolymer as mentioned above, Beck stated that it "would have been" subsequent to the time they looked at the sample and that it was based in part on information that he did not obtain until the summer of 1954 or later (BR-2076; 2077).

Beck further testified that at the time infrared spectrum K6365 (BX-255) was recorded there was no measurement of the thickness of the film and they were not specifically interested in measuring any of the absorptivities but that "we were interested principally in an interpretation as qualitative evaluation of the structural possibilities" (BR-1741). The record shows that subsequently, other infrared scans (BX-37, 39 and 40) were run on samples said to be polypropylene prepared by Baxter in August 1954 and that subsequent discussions took place between Beck and Baxter about them. Beck stated that he made no written report other than PRCD Report 56-8 (ZCX-19) dated February 6, 1956 (and the above-mentioned PRAL report, BX-18) which dealt with the interpretation of scans of substances designated as polypropylene which scans were made during 1954.

Beck also testified (with respect to his interpretation of the infrared spectrum K6365) at BR-1601, 1609 and 1763.

> We might further conclude, although we could not identify the presence or absence of it specifically in the spectrum, that there was the possibility of crystallinity in the polymer.
>
> • • •
>
> Yes. I don't believe that in May of 1954, when we looked at the spectrum we could at that time attribute any band or group of bands as being specifically due to the crystalline or the amorphous content of the polymer. We noted earlier the similarity in the 10

micron band and the 10.3 micron band to the band-splitting observed in polyethylene at 13.7 and 13.9 microns. We could conjecture, if you like, that in this polymer system there was the possibility of some crystallinity because of its presence in polyethylene, and because, as I mentioned earlier, of the similarity in some band shapes. We would have suggested at that time that crystallinity measurements on the polymer be made by another technique. We would have recommended an X-ray evaluation or an X-ray pattern of the polymer film to measure or detect the presence or absence of any crystallinity.

• • •

I don't believe it would have been possible at that time, in May of 1954, to have specified that the absorption bands at 10.03 and approximately 11.9 microns were due to crystallinity.

This latter statement was made in response to questions about the testimony of Stamatoff (BR-521 to 526) that a statement included in his affidavit of July 30, 1962 (Paper No. 16 in Baxter et al. application, Serial No. 451,064) that the absorption bands 10.0 and 11.9 (in infrared scan No. K6365) show the presence of polypropylene crystallinity was based on information supplied in May (1954) by Yakubik (Beck). Beck testified (BR-1766, 1767) that Stamatoff's attributing to him that statement about polypropylene crystallinity was incorrect and that that information was not supplied to Stamatoff by him at the time this scan was run.

The record shows that the sample of polymer prepared by Baxter on May 18, 1954 was, on July 6, 1954, submitted for X-ray analysis which was carried out under the supervision or at the direction of Ryland and that PRAL Report No. 12422 (BX-38) was prepared by her on August 2, 1954. This report states:

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> Standard pattern taken for our files -F-54-361. A thicker sample would provide a better pattern and more information.

Beck stated that he had seen the above report, BX-38, that Ryland had reported the results to him "verbally" and that Ryland had indicated ". . . that the sample thickness was not sufficient to get a complete pattern whereby she could measure with any degree of exactness the crystallinity in the sample." Beck further stated that (BR 1611):

> I think the pattern that we saw initially, although not completely measurable in terms of the quantitization of crystallinity, suggested the presence of crystallinity in the pattern. I beieve it was this suggestion of crystallinity that prompted us to ask whether an alternate procedure could be utilized in X-ray to obtain a number.

Back then testified that to the best of his recollection no number was obtained from X-ray measuring quantitatively the crystallinity of this sample. Beck was questioned as to whether he had any recollection of the circumstances under which the submission of the sample was not made until July 6, 1954 although the infrared scan (BX-25) was made by him on May 18, 1954. Beck replied (BR-1811, 1812) that it was possible that "Dr. Baxter was not necessarily interested at the time of our initial discussion regarding the interpretation of the spectrum in a crystallinity measurement."

Ryland, who was assigned to the X-ray Diffraction Group at Du Pont, testified that on July 6, 1954 she received from Beck a sample in the form of a film and that Beck had stated that he had concluded that the infrared spectrum of this material "was consistent with its indication as polypropylene." Ryland identified BX-V as an

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X-ray diffraction photograph (powder photograph) made of the above-mentioned sample and testified that the PRAL 14333 (BX-38) refers to this pattern. It appears that a second X-ray diffraction pattern (BX-W) was prepared from this sample on July 13, 1954 on a different camera but Ryland testified (BR-1619) that no new information was produced from this second film (BX-W). The record shows that there was no quantitative determination of the crystallinity of the above sample and Ryland testified (BR-2617) that she reported to Beck only that the polymer was partially crystalline.

The record shows that later, on August 12, 1954, an X-ray scan (BX-52) of another sample dessignated 4544-73 received by Ryland from Baxter was prepared and that it was determined (by Stein, Ryland and Whitney) from the scan that it was 18% crystalline and it was reported on BX-23 that it was 15-25% crystalline. It appears that this sample 4544-73 was prepared by Baxter on August 11, 1954 (BX-20, page 73). Ryland also testified (BR-2650, 2651) that "this was the first attempt we had ever made to make a quantitative estimate of crystallinity of polypropylene, and we considered that this was not in any sense an absolute measurement. . . ." And at BR-2641 Ryland further testified:

> . . . This was the first scan we had ever seen of polypropylene, and consequently we had no a priori knowledge of the exact shape or location of the amorphous halo or the proper way in which the area should be determined.

Page 73 of BX-20 shows that the catalyst used in the August 11, 1954 experiment was the combination of titanium tetrachloride and lithium aluminum tetrahexyl and that 45 grams of solid material were produced.

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The record presented also shows that sometime after August 1954 further work on polypropylene was turned over to other personnel at Du Pont. It appears from NX-446 that in January 1955 those at Du Pont were working toward finding appropriate uses for their polypropylene.

CONCLUSIONS OF LAW

Baxter et al. urge that the polypropylene made by Baxter on May 17-18, 1954 resulted in a reduction to practice of the invention of the count and that a full conception occurred simultaneous therewith. We have considered the entire record presented by Baxter et al. as well as that presented by Natta et al. in rebuttal but we cannot agree with the position of Baxter et al. We agree with Baxter et al. that the record establishes that on May 17-18, 1954 Baxter prepared a very small amount (0.5 g.) of a solid material from propylene using titanium tetrachloride and phenyl magnesium bromide as catalyst and that this material was subjected to analysis by infrared by May 21, 1954. It is our opinion that neither conception nor reduction to practice of the invention of the count is established merely because a solid said to be "tough and elastic" was prepared from propylene.

It is fundamental that in order to establish either conception or reduction to practice it must appear that the product includes all the limitations of the count and be appreciated by the inventor at the time it was made. Here, we do not find any evidence that Baxter et al. had even a conception of a polypropylene product having a substantial crystalline polypropylene content at the time of the above experiment. None of the reports or letters written *at that time* referred to a substantial crystalline polypropylene content. Baxter's own letter (BX-21) to Gresham "to aid the Patent Section in formulating a

patent disclosure" refers to his experiment 4427-86 but does not mention any crystallinity in the product.

Although Anderson stated that at the time he saw the solid produced by Baxter he "considered the possibility" of crystallinity present, therein it does not appear that this possibility was communicated to Baxter by Anderson at that time and Anderson made no written record relating to his so considering this product. On the other hand, Anderson in his report of June 15, 1954 (BX-48), mentioned only the use of "new catalyst systems" to produce high density polyethylene at room temperature and atmospheric pressure and "other potentially valuable hydrocarbon polymers and copolymers" and in his further report of June 18, 1954 (BX-49) it is stated that propylene had been polymerized at low pressures to a high polymer by the use of the "new method." It appears to us that Anderson's above testimony amounts to no more than a statement of his possible thoughts at that time. For this reason, and in view of the fact that this testimony was given more than eleven years after the event and is not supported by any contemporaneous written record, we are of the opinion that this testimony is entitled to be accorded little or no weight toward establishing a conception by Baxer et al., see Walter v. Ryan, 55 CCPA 1251, 158 USPQ 216 (at 222). It is also to be noted that this testimony was given well after knowledge of Natta's work on crystalline polypropylene was available at Du Pont and after the interference was declared.

Nor do we regard the testimony of Beck relative to crystallinity sufficient to establish a conception or reduction to practice by Baxter et al. on May 17-18, 1954. It is clear to us that the infrared spectrum run by Beck did not show that the product had any polypropylene crystallinity. As pointed out above, Beck testified only that by looking at the curve he could speculate or conjecture about the pos-

sibility of some crystallinity being present. We note that the sample prepared on May 17-18, 1954 was not submitted for X-ray examination under July 6, 1954, (after the Natta et al. effective filing date of June 8, 1954) which Beck stated might have been due to a lack of interest in crystallinity by Baxter. This testimony is clearly inconsistent with any assertion that Baxter et al. had any conception of a product containing a substantial crystalline polypropylene content prior to June 8, 1954. It is clear that at this time there was no determination that the May 17-18, 1954 product had any substantial crystalline polypropylene content.

Although the testimony of Ryland and Beck indicates that sample 4427-86 (prepared May 17-18, 1954) was found to include some crystalline content (which was reported to Beck by Ryland on or about August 2, 1954, BX-38) there was no indication of the amount of crystallinity in this sample or whether it could be considered as a substantial crystalline content. Further, in view of Beck's testimony (BR-1602) that the infrared spectrum (BX-25) would lead one to suspect that polyethylene might be present in the sample it could not be concluded that any crystallinity present was polypropylene crystallinity rather than polyethylene crystallinity.

It is our view that BX-52 and the PRAL report based thereon (BX-23) and the testimony relating to these exhibits cannot be relied on to establish that the product prepared by Baxter on May 17-18, 1954 had the crystalline polypropylene content required by the count. The X-ray scan (BX-52) was not run on the May 17-18, 1954 sample but one which was not prepared until August 11, 1954 (shortly prior to filing the Baxter et al. parent application on August 19, 1954). Further, the August 11, 1954 (BX-20, page 73) experiment involved the use of a different catalyst and resulted in the production of a much larger yield

(45 g.) of solid material than did the May 17-18, 1954 experiment. It is our opinion that no conclusion as to the crystalline polypropylene content of the May 1954 product may be drawn based on tests run on a product prepared at a later date by a different process. Further, a reduction to practice cannot be proved *nunc pro tunc*, Searle v. Glarum et al., 37 CCPA 896, 84 USPQ 454, 457. Certainly the above exhibits do not establish that Baxter et al., in May 1954, had any conception of a product with the crystalline polypropylene content of the count.

In summary, as to the crystallinity of the product made May 17-18, 1954 by Baxter, the infrared analysis did not establish the presence of any crystalline polypropylene content, the X-ray studies (BX-V and BX-W) do not establish that any crystallinity present is "substantial" as required by the count or that it is polypropylene crystallinity in view of the testimony as to the possible presence of polyethylene. Further, the above X-ray analysis is too late to prove a conception or reduction to practice on May 17-18, 1954 or any date prior to the Natta et al. effective date. The crystallinity measurement made August 12, 1954, aside from similarly being too late, was made on a product made by a different process and hence does not establish that the product of May 17-18, 1954 had the same amount of crystalline polypropylene.

It is indicated on PRAL 9725 (BX-18) which refers to the infrared spectrum of May 18, 1954 (BX-25) that the band at 8.69 u may be due to isolated methyl groups, which Beck and Baxter stated was consistent with the head to tail propylene unit structure of the polymer. Although the above exhibits and testimony may be regarded as showing that the solid did include some recurring propylene units, it was admitted by Beck (BR-1741) that at that time they were interested in a *qualitative* evaluation of the structural possibilities and were not concerned with measuring any

of the absorptivities on the spectrum. As we pointed out above, Beck testified that the infrared spectrum could in May 1954 lead to the suspicion that polyethylene was present. In our opinion the above testimony is not sufficient to support the conclusion that Baxter et al., conceived a product *consisting essentially* of recurring propylene units in May of 1954.

A reduction to practice is not complete until a utility for the claimed product is established. We do not find sufficient evidence to establish the utility of the product prepared on May 17-18, 1954. All that was done was that the small film about 1½ inches by ½ inch was pulled on by Baxter and that he considered that the material was "tough and elastic." There was no indication at that time that Baxter considered it useful for any practical purpose. We cannot agree that its utility was obvious; compare Fang v. Hankins et al., 55 CCPA 1468, 158 USPQ 345. We are aware that the type and extent of tests necessary to establish a reduction to practice depends on the facts of each case, but we do not agree that finding a material tough and elastic by pulling a small piece of material in one's hand is sufficient to show that it could be used for any practical purpose. We regard NX-446 as indicating that Baxter et al., even in January 1955 were not sure what the material could be used for.

Baxter et al., have referred to another experiment run on May 19, 1954 (BX-17, page 97) which was said to be a duplicate of the experiment recorded on page 86 of that exhibit in which 0.3 gram of a solid was produced. There was no analysis or testing of this product and it is clear that this experiment cannot be relied on for either conception or reduction to practice of the product, as defined in the count.

We cannot agree that Merckling, Robinson or Stamatoff are properly named as coinventors with Baxter. The

record shows that they all were present at the time of the work relied upon and took part in discussions of the polymerization work involving propylene done at Du Pont.

For the above reasons we conclude that Baxter et al. have failed to establish either a conception or reduction to practice of the invention defined by the count prior to the Natta et al. effective date, June 8, 1954. In the absence of a prior conception the question of diligence by Baxter et al. is moot and need not be discussed. In re Tansel, 45 CCPA 834, 117 USPQ 188, 253 F.2d 241.

SUMMARY

We summarize our conclusions as follows:

(1) Natta et al. are entitled to June 1954 for conception and constructive reduction to practice under 35 U.S.C. 119.

(2) The count is not supported in the Hogan et al. application filed January 27, 1953 (S.N. 333,576).

(3) Hogan et al. have not established a reduction to practice prior to the effective filing date of Baxter et al. or Natta et al.

(4) The count is supported in the Zletz application involved in this interference.

(5) Zletz has not established a reduction to practice prior to the effective filing dates of Baxter et al. or Natta et al.

(6) The count is supported in both the Baxter et al. application involved in interference and in their prior application filed August 19, 1954 (S.N. 451,064). Baxter et al. therefore are entitled to this latter date for conception and constructive reduction to practice.

Appendix C

(7) Baxter et al. have not established either conception or reduction to practice prior to the effective filing date of Natta et al.

In view of the above, priority is hereby awarded to Giulio Natta, Piero Pino and Georgio Mazzanti, the senior party.

JAMES S. BAILEY

James S. Bailey,
Examiner of Interferences

L. H. GASTON

L. H. Gaston,
Examiner of Interferences

G. K. MILESTONE

G. L. Milestone,
Examiner of Interferences

APPENDIX D

Judgment of the District Court.

IN THE UNITED STATES DISTRICT COURT

FOR THE DISTRICT OF DELAWARE

STANDARD OIL COMPANY (INDIANA), Plaintiff, v. MONTEDISON, S.p.A., et al., Defendants.	CONSOLIDATED CIVIL ACTION No. 4319
PHILLIPS PETROLEUM COMPANY, Plaintiff, v. MONTEDISON, S.p.A., et al., Defendants.	
E. I. du PONT de NEMOURS & COMPANY, Plaintiff, v. MONTEDISON, S.p.A., et al., Defendants.	

JUDGMENT

This cause having come on to be tried before the Court, and the Court having considered the evidence introduced by the parties, and the briefs and arguments presented on their behalf, and having heretofore made and filed its

memorandum opinion constituting its Findings of Fact and Conclusions of Law, it is hereby

ORDERED, ADJUDGED, AND DECREED as follows:

1. That the Court has jurisdiction over the subject matter of this action brought under 35 U.S.C. § 146 to review the final decision of the Board of Patent Interferences of the Patent ad Trademark Office, dated November 29, 1971, in Interference No. 89,634, said interference proceeding having been instituted to determine priority of invention of the count in issue, namely:

> Normally solid polypropylene, consisting essentially of recurring propylene units, having a substantial crystalline polypropylene content.

2. That the Court has jurisdiction over the parties herein, Phillips Petroleum Company, Montedison, S.p.A., Standard Oil Company and E. I. Du Pont De Nemours & Company.

3. That the award of priority of the invention of the count in issue by the Board of Patent Interferences of the Patent and Trademark Office in favor of the assignors of Montedison, S.p.A., and adverse to the assignors of Phillips Petroleum Company, is hereby reversed.

4. That priority of the invention of the count in issue in Interference No. 89,634 is hereby awarded to John Paul Hogan and Robert L. Banks, assignors to Phillips Petroleum Company, as the true, first, original and joint inventors of the invention of said count.

5. That the invention of the count in issue is novel, useful and unobvious, and is patentable to John Paul Hogan and Robert L. Banks, and they and their assignee, the Phillips Petroleum Company, are entitled according to law

to receive and have duly issued United States Letters Patent for the invention of said count.

6. That the Commissioner of Patents and Trademarks is authorized to issue such Letters Patent to applicants John Paul Hogan and Robert L. Banks, and their assignee, the Phillips Petroleum Company, upon the filing in the Patent and Trademark Office of a certified copy of this judgment and on compliance with the requirements of law.

7. That the plaintiff, Phillips Petroleum Company, recover its costs in accordance with Rule 54(d), F.R.Civ.P.

CALEB M. WRIGHT
United States District Judge

Date: February 28th, 1980

APPENDIX E

Judgment of the Court of Appeals.

UNITED STATES COURT OF APPEALS

FOR THE THIRD CIRCUIT

Nos. 80-1553/80-1555

STANDARD OIL COMPANY, A corporation of Indiana

vs.

MONTEDISON, S.p.A., a corporation of Italy, PHILLIPS PETROLEUM COMPANY, a corporation of Delaware and E. I. Du PONT de NEMOURS and COMPANY, a corporation of Delaware

STANDARD OIL COMPANY (Indiana), Appellant in No. 80-1553

E. I. du PONT de NEMOURS and Company, Appellant in No. 80-1554

Montedison, S.p.A., Appellant in No. 80-1555

(D. C. Civil No. 72-4319)

ON APPEAL FROM THE UNITED STATES DISTRICT COURT FOR THE DISTRICT OF DELAWARE

Present: HUNTER and SLOVITER, *Circuit Judges* and MEANOR, *District Judge**

---

* Honorable H. Curtis Meanor, United States District Judge for the District of New Jersey, sitting by designation.

Appendix E

JUDGMENT

This cause came on to be heard on the record from the United States District Court for the District of Delaware and was argued by counsel on April 23, 1981.

On consideration whereof, it is now here ordered and adjudged by this Court that the judgment of the said District Court, entered February 28, 1980, be, and the same is hereby affirmed. Costs taxed against appellants.

ATTEST:

SALLY MRVOS
Clerk

October 14, 1981

APPENDIX F

Relevant Sections of the Patent Act of 1952.

§ 101. Inventions patentable

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

§ 102. Conditions for patentability; novelty and loss of right to patent

A person shall be entitled to a patent unless—

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for patent, or

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of the application for patent in the United States, or

(c) he has abandoned the invention, or

(d) the invention was first patented or caused to be patented, or was the subject of an inventor's certificate, by the applicant or his legal representatives or assigns in a foreign country prior to the date of the application for patent in this country on an application for patent or inventor's certificate filed more than twelve months before the filing of the application in the United States, or

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for

patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent, or

(f) he did not himself invent the subject matter sought to be patented, or

(g) before the applicant's invention thereof the invention was made in this country by another who had not abandoned, suppressed, or concealed it. In determining priority of invention there shall be considered not only the respective dates of conception and reduction to practice of the invention, but also the reasonable diligence of one who was first to conceive and last to reduce to practice, from a time prior to conception by the other.

§ 103. Conditions for patentability; non-obvious subject matter

A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

§ 112. Specification

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make

and use the same, and shall set forth the best mode contemplated by the inventor of carrying out his invention.

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

A claim may be written in independent or, if the nature of the case admits, in dependent or multiple dependent form.

Subject to the following paragraph, a claim in dependent form shall contain a reference to a claim previously set forth and then specify a further limitation of the subject matter claimed. A claim in dependent form shall be construed to incorporate by reference all the limitations of the claim to which it refers.

A claim in multiple dependent form shall contain a reference, in the alternative only, to more than one claim previously set forth and then specify a further limitation of the subject matter claimed. A multiple dependent claim shall not serve as a basis for any other multiple dependent claim. A multiple dependent claim shall be construed to incorporate by reference all the limitations of the particular claim in relation to which it is being considered.

An element in a claim for a combination may be expressed as a means or step for performing a specified function without the recital of structure, material, or acts in support thereof, and such claim shall be construed to cover the corresponding structure, material, or acts described in the specification and equivalents thereof.

§ 119. Benefit of earlier filing date in foreign country; right of priority

An application for patent for an invention filed in this country by any person who has, or whose legal representatives or assigns have, previously regularly filed an application for a patent for the same invention in a foreign

country which affords similar privileges in the case of applications filed in the United States or to citizens of the United States, shall have the same effect as the same application would have if filed in this country on the date on which the application for patent for the same invention was first filed in such foreign country, if the application in this country is filed within twelve months from the earliest date on which such foreign application was filed; but no patent shall be granted on any application for patent for an invention which had been patented or described in a printed pubication in any country more than one year before the date of the actual filing of the application in this country, or which had been in public use or on sale in this country more than one year prior to such filing.

No application for patent shall be entitled to this right of priority unless a claim therefor and a certified copy of the original foreign application, specification and drawings upon which it is based are filed in the Patent and Trademark Office before the patent is granted, or at such time during the pendency of the application as required by the Commissioner not earlier than six months after the filing of the application in this country. Such certification shall be made by the patent office of the foreign country in which filed and show the date of the application and of the filing of the specification and other papers. The Commissioner may require a translation of the papers filed if not in the English language and such other information as he deems necessary.

In like manner and subject to the same conditions and requirements, the right provided in this section may be based upon a subsequent regularly filed application in the same foreign country instead of the first filed foreign application, provided that any foreign application filed prior to such subsequent application has been withdrawn, abandoned, or otherwise disposed of, without having been laid

open to public inspection and without leaving any rights outstanding, and has not served, nor thereafter shall serve, as a basis for claiming a right to priority.

Applications for inventors' certificates filed in a foreign country in which applicants have a right to apply, at their discretion, either for a patent or for an inventor's certificate shall be treated in this country in the same manner and have the same effect for purpose of the right of priority under this section as applications for patents, subject to the same conditions and requirements of this section as apply to applications for patents, provided such applicants are entitled to the benefits of the Stockholm Revision of the Paris Convention at the time of such filing.

§ 120. Benefit of earlier filing date in the United States

An application for patent for an invention disclosed in the manner provided by the first paragraph of section 112 of this title in an application previously filed in the United States, or as provided by section 363 of this title, by the same inventor shall have the same effect, as to such invention, as though filed on the date of the prior application, if filed before the patenting or abandonment of or termination of proceedings on the first application or on an application similarly entitled to the benefit of the filing date of the first application and if it contains or is amended to contain a specific reference to the earlier filed application.

§ 135. Interferences

(a) Whenever an application is made for a patent which, in the opinion of the Commissioner, would interfere with any pending application, or with any unexpired patent, he shall give notice thereof to the applicants, or applicant and patentee, as the case may be. The question of priority of invention shall be determined by a board of patent interferences (consisting of three examiners of in-

terferences) whose decision, if adverse to the claim of an applicant, shall constitute the final refusal by the Patent and Trademark Office of the claims involved, and the Commissioner may issue a patent to the applicant who is adjudged the prior inventor. A final judgment adverse to a patentee from which no appeal or other review has been or can be taken or had shall constitute cancellation of the claims involved from the patent, and notice thereof shall be endorsed on copies of the patent thereafter distributed by the Patent and Trademark Office.

§ 146. Civil action in case of interference

Any party to an interference dissatisfied with the decision of the board of patent interferences on the question of priority, may have remedy by civil action, if commenced within such time after such decision, not less than sixty days, as the Commissioner appoints or as provided in section 141 of this title, unless he has appealed to the United States Court of Customs and Patent Appeals, and such appeal is pending or has been decided. In such suits the record in the Patent and Trademark Office shall be admitted on motion of either party upon the terms and conditions as to costs, expenses, and the further cross-examination of the witnesses as the court imposes, without prejudice to the right of the parties to take further testimony. The testimony and exhibits of the record in the Patent and Trademark Office when admitted shall have the same effect as if originally taken and produced in the suit.

Such suit may be instituted against the party in interest as shown by the records of the Patent and Trademark Office at the time of the decision complained of, but any party in interest may become a party to the action. If there be adverse parties residing in a plurality of districts not embraced within the same state, or an adverse party residing in a foreign country, the United States District

Appendix F

Court for the District of Columbia shall have jurisdiction and may issue summons against the adverse parties directed to the marshal of any district in which any adverse party resides. Summons against adverse parties residing in foreign countries may be served by publication or otherwise as the court directs. The Commissioner shall not be a necessary party but he shall be notified of the filing of the suit by the clerk of the court in which it is filed and shall have the right to intervene. Judgment of the court in favor of the right of an applicant to a patent shall authorize the Commissioner to issue such patent on the filing in the Patent and Trademark Office of a certified copy of the judgment and on compliance with the requirements of law.

Opposition

Office - Supreme Court, U.S.
FILED
MAR 17 1982
ALEXANDER L. STEVAS
CLERK

No. 81-1303

IN THE

Supreme Court of the United States

October Term, 1981

STANDARD OIL COMPANY (INDIANA),

Petitioner,

v.

PHILLIPS PETROLEUM COMPANY,

Respondent.

On Petition for a Writ of Certiorari to the United States Court of Appeals for the Third Circuit

PHILLIPS' BRIEF IN OPPOSITION

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IN THE

Supreme Court of the United States

October Term, 1981

No. 81-1303

STANDARD OIL COMPANY (INDIANA),

Petitioner,

v.

PHILLIPS PETROLEUM COMPANY,

Respondent.

On Petition for a Writ of Certiorari to the United States Court of Appeals for the Third Circuit

PHILLIPS' BRIEF IN OPPOSITION

Petitioner seeks no more than a review by this Court of the concurrent fact findings of the two lower courts. There are no legal conflicts involved here; the law on these issues is settled. Petitioner merely asks this Court to consider whether the new polypropylene described in Phillips' patent application here in issue is inherently the same as the new polypropylene defined by the Patent Office for purposes of the interference proceeding. On that issue of fact, the concurrent findings of both lower courts, based on evidence characterized by both as clear and convincing, are that the two polypropylenes are the same. The petition should therefore be denied.

STATEMENT OF THE CASE

Petitioner's statement of the case is highly argumentative, assumes facts which are contrary to the record, and is wholly inadequate to an understanding of the nature of the proceedings. Respondent therefore provides the following, more complete statement.

1. An Overview of the Case

Phillips Petroleum Company ("Phillips")[1] initiated this action in January 1972 to establish its inventors' rights of priority—and the consequent right to a patent—on a new composition of matter, usually referred to as "crystalline polypropylene." Phillips brought the action under 35 U.S.C. § 146 to reverse the earlier decision of the United States Patent and Trademark Office ("Patent Office"), which awarded priority to Giulio Natta and his co-workers, employees of Montedison, S.p.A. ("Montedison") (2a-5a). The trial court reversed that Patent Office decision and found that Phillips' scientists, John P. Hogan and Robert L. Banks, were the first inventors of crystalline polypropylene, that they are entitled to the award of priority, and that they are entitled to the patent for that invention (128a-85a, 336a-38a).

The trial court found in Phillips' favor for two independent reasons, both supported by clear and convincing evidence (185a). Phillips' inventors were the first to actually reduce the invention to practice by making and recognizing crystalline polypropylene in the period between June 1951 and January 1953 (128a-49a). Phillips' inventors were also the first to constructively reduce the invention to practice because they were the first to file, on January 27, 1953, a

[1] Pursuant to Rule 28.1 of this Court, Phillips states that it has no parent. Phillips' subsidiaries and affiliates (not wholly owned) are listed in the Appendix, attached hereto.

patent application for that invention (the " '53 application") fully complying with the applicable statutory requirements set forth in 35 U.S.C. § 112 ("§112") (149a-85a).

The court of appeals limited its consideration to the second of these two independent reasons for the trial court's judgment, constructive reduction to practice (11a-12a). Finding the proofs on that issue clear and convincing, the court affirmed (8a-9a, 339a-40a).

2. The Patent Office Proceedings

The contest over patent rights to crystalline polypropylene began during the "interference" which the Patent Office officially declared on September 9, 1958 (2a-3a n.2, 46a-47a). The four parties below[2] were all made parties to the interference because all four had filed patent applications claiming the new polypropylene as their invention (*Id.*). Because each described the new polypropylene somewhat differently in their various patent applications, the Patent Office examiner drafted a common interference "count" defining crystalline polypropylene for purposes of the interference contest (47a). The count reads (14a):

> Normally solid polypropylene, consisting essentially of recurring propylene units, having a substantial crystalline polypropylene content.

The first patent application ever to describe and claim crystalline polypropylene, as both lower courts found, is the Phillips '53 application. That application describes the new polypropylene and its properties as follows (23a):

> The solid [polypropylene] . . . is insoluble in pentane at room temperature. The solid material has a melting

[2] The parties are: Phillips Petroleum Company, Standard Oil Company (Indiana), Montedison, S.p.A. and E. I. du Pont de Nemours and Company.

> point in the range of 240 to 300°F, a density in the range of 0.90 to 0.95, an intrinsic viscosity in the range of 0.2 to 1.0, and a weight average molecular weight in the range of approximately 5,000 to 20,000.

The application claims the same product as Hogan and Banks' invention. Claim 31 reads as follows (17a):

> A solid polypropylene made by the process of claim 22, having a melting point in the range of 240 to 300° F, a density in the range of 0.90 to 0.95, an intrinsic viscosity in the range of 0.2 to 1.0, and a weight average molecular weight in the range of 5,000 to 20,000.

While the '53 application does not describe the composition in the same language used by the examiner in the interference count, namely with the words "crystalline" or "recurring propylene units," the new polypropylene described in the application, as both lower courts found, is, in fact, the crystalline polypropylene of the count (14a-36a, 149a-76a).

During the early stages of the Patent Office proceedings, Montedison committed fraud upon the Patent Office examiner in a way which severely prejudiced his evaluation of Phillips' '53 application. The fraud is discussed at length in the trial court's opinion (185a-211a). Suffice it to say here that as a result of questions asked by the examiner during an *ex parte* interview, Montedison was placed under a duty to divulge its own test results showing that the new polypropylene of Phillips' '53 application was highly crystalline (190a-205a). Montedison withheld that information, however, and the withholding had a direct and adverse effect on the examiner's 1962 decision on motions in the interference (206a-08a). In that decision, the examiner held there was at least a "reasonable doubt" that the new polypropylene described in the '53 application was, in fact, crystalline polypropylene (206a).

That 1962 decision was left undisturbed when the Patent Office Board of Interference Examiners (the "Board") issued its final decision on November 29, 1971, refusing Phillips its constructive reduction to practice based on the '53 application (281a). The Board also rejected Phillips' proofs of actual reduction to practice (296a).[3] The award of priority went to Montedison, whose earliest patent application disclosing the new composition was filed in Italy in June 1954, three years after Phillips began its polypropylene work and a year and a half after Phillips filed its '53 application. Phillips and the other losing parties, including petitioner, brought these proceedings in the United States District Court for the District of Delaware in January 1972.

3. The Trial Court's Review of Phillips' Priority Case

The case was tried over a period of eight months between the fall of 1977 and the spring of 1978. The trial court reviewed the voluminous record compiled in the Patent Office, as well as considerable new evidence. To aid in its evaluation of that record, the trial court heard expert testimony from all parties regarding the interpretation of infrared spectra, X-ray diffraction patterns, physical properties such as melting point, density and solubility characteristics, and utility (*see, e.g.*, 64a-67a). After a full hearing and post-trial briefing, the trial court found that Phillips' proofs were clear and convincing evidence that Phillips had reduced the invention to practice, both actu-

[3] The Board's approach to Phillips' proofs of actual reduction to practice suffered a fundamental legal error. Where that same legal error has been present in other Board decisions, those decisions have uniformly been reversed when reviewed by the United States Court of Customs and Patent Appeals. An excellent discussion of the Board's error in that regard is contained in *Silvestri* v. *Grant*, 496 F.2d 493 (C.C.P.A. 1974), *cert. denied*, 420 U.S. 928 (1975), which petitioner now agrees states the correct rule of law (Petition at 20).

ally[4] and constructively, no later than January 27, 1953, the date of Phillips' '53 application (128a, 185a).

In evaluating the Phillips '53 application, the trial court, following the applicable statute, 35 U.S.C. § 112, focused on what the text of the application—particularly the melting point, density, solubility characteristics and other properties—meant to persons skilled in the art when the application was filed in 1953 (149a-53a, 172a-73a). The court accepted the testimony of Professors Fox and Bailey, fully supported by the scientific literature of the 1953 era, that the properties used in the '53 application to describe the new polypropylene necessarily meant that it was the crystalline polypropylene of the count (*Id.*).

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[4] As to actual reduction to practice, the trial court required that Phillips' inventors prove, by clear and convincing evidence, that they had done three things:

(1) That, before any of the other parties, Phillips' inventors actually made crystalline polypropylene; the court found that Phillips' infrared spectra, X-ray diffraction patterns and physical property measurements on its pre-1953 products showed unequivocally that those early products were, in fact, crystalline polypropylene (131a-40a).

(2) That, before any of the other parties, Phillips' inventors recognized and appreciated the invention; relying carefully on documents prepared at Phillips in 1951 through 1952, the court found that Phillips' inventors, by January 27, 1953, had recognized and appreciated their invention of crystalline polypropylene (140a-44a).

(3) That, before any of the other parties, Phillips' inventors recognized a specific practical utility for their crystalline polypropylene; the court found that documents prepared in 1951-53 established that Phillips' inventors had recognized the pre-1953 products' practical utility (145a-49a).

Although unchallenged here by petitioner, these findings, particularly the finding of recognition and appreciation, are contrary to petitioner's assumptions of fact. *See infra* at 11-13.

The trial court also considered evidence that the new polypropylene of Phillips' '53 application had been reproduced and extensively analyzed by six research teams: by Dr. Capucci of Montedison (154a-61a), by Dr. Eleuterio of du Pont (161a-62a), by Dr. Trada of Societa Edison (162a-63a), by Mr. Witt (163a-67a) and Mr. DeLap of Phillips (167a-69a), and by Professor Longi of Montedison (169a-72a). These experiments show unequivocally that the new polypropylene described in the '53 application "always and invariably satisfied the limitations of the Count" (172a). In conclusion, the court awarded Phillips its constructive reduction to practice, finding "that Phillips' 1953 application disclosed crystalline polypropylene" (173a).[5]

4. The Decision of the Third Circuit Court of Appeals

The Third Circuit Court of Appeals affirmed the trial court's judgment (339a-40a), finding that Phillips proved its case by "the clear and convincing burden of proof ordinarily imposed on a plaintiff challenging the Board's decision in an interference . . . ." (9a). While the trial court's fact findings, based as they were on live expert testimony, were properly reviewable in the court of appeals under the "clearly erroneous" standard of Rule 52(a), FED.R.CIV.P. (10a-11a), the court of appeals, at the insistence of the petitioner and the other appellants, undertook an independent and meticulous review of the record (11a).

The court independently evaluated the '53 application and the testimony of Professors Fox and Bailey that the

[5] The court also found that the application satisfied all the other statutory requirements of § 112, namely, it set out how to make the new polypropylene, how to use it and the best mode known to the inventors for both making and using it (176a-85a).

application's description of its new polypropylene necessarily communicated, to a person skilled in the art in 1953, the characteristics of the crystalline polypropylene defined by the interference count (17a-31a). The court fully considered, discussed and ultimately rejected appellants' arguments that the disclosure in the '53 application was insufficient (*Id.*).

The court of appeals further reviewed the reproduction evidence and found that the new polypropylene described in the '53 application was always and invariably the crystalline polypropylene of the count (31a-36a). The court considered petitioner's contentions of fact, again raised here, that certain so-called unsuccessful experiments were not given sufficient weight by the trial court (*Id.*). The court of appeals held that those experiments, in which the '53 application was not followed, were irrelevant (*Id.*).

Concluding that it was unnecessary to go further than the detailed study and specific affirmance of Phillips' constructive reduction to practice, the court of appeals did not reach the appellants' arguments regarding Phillips' actual reduction to practice or the issue of Montedison's fraud.

No petitions for rehearing were filed in the court below.

ARGUMENT

I.

PETITIONER'S QUESTIONS ARE NOT PRESENTED BY THE FACTS OF THIS CASE

Petitioner's three questions, while differently phrased, all come down to only one issue. Petitioner admits that the controlling law for judging the adequacy of a patent application is § 112. Petitioner further admits that, while § 112 requires that the application describe the invention at issue, the description need not be in the same terms as the interference count so long as the description meets the invariability test of the inherency doctrine (Petition at 23-29). And petitioner admits that the '53 application does describe the invention, albeit in terms different from those used in the count (Petition at i, ¶ 1(ii)). Thus, the only issue raised by petitioner comes down to a question of fact: is the new polypropylene described in the '53 application invariably the new polypropylene of the interference count?

The concurrent findings of both lower courts are that it is, on a record characterized by both as clear and convincing (9a, 185a). As this Court has said many times, the Court will not review evidence or decide facts found by lower courts, particularly where both lower courts have reached the same conclusions.[6] For that reason alone, the petition should be denied.

Petitioner's argument is based on repeated misrepresentations of the record. The principal contention underlying all three of petitioner's questions is that the court of appeals "admitted that one following the disclosure of the Phillips

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[6] *Graver Tank & Mfg. Co.* v. *Linde Air Products Co.*, 336 U.S. 271, 275 (1949); *Universal Oil Products Co.* v. *Globe Oil & Ref. Co.*, 322 U.S. 471, 473 (1944); *Goodyear Tire & Rubber Co.* v. *Ray-O-Vac Co.*, 321 U.S. 275, 278 (1944).

1953 application does not always and invariably obtain the invention at issue" (Petition at 23). Nothing could be further from the truth. Both courts below found that one always gets crystalline polypropylene when one reproduces the Phillips '53 disclosure.[7]

Similarly, petitioner contends that there were numerous experiments, supposedly unsuccessful, which were neglected by the lower courts (Petition at 23-29). Far from being neglected, the significance of the experiments which petitioner characterizes as unsuccessful was fully thrashed out in both courts (31a-36a, 69a-70a, 152a-72a). After very thorough consideration of a mass of highly complex technological evidence, these experiments were found to be irrelevant because they did not represent the process and product of the Phillips '53 application (*Id.*).

Petitioner contends further that the new polypropylene disclosed in the Phillips '53 application is not crystalline

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[7] In its thorough review of the trial court's decision, the court of appeals concluded (31a, 35a):

> In addition to reliance on the properties of the Phillips' polypropylene set forth in its 1953 application, the district court also relied on the results of certain repetition experiments which were conducted by six independent research groups, including Montedison's and DuPont's research scientists, during the period 1955 to 1965. The district court found that those experiments followed the disclosures in Phillips' 1953 application and that the products obtained as a result contained the necessary count structure.
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> The district court . . . focused on the results of the experiments using processes which did parallel those described in Phillips' 1953 application and produced products that fell within the given property ranges. Significantly, each of those products which did fall within the given property ranges was found to be crystalline polypropylene. [Footnote omitted.]

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polypropylene, but is "cross-linked" and "tree-branched," as supposedly found by two Phillips workers, Dr. Nowlin and Mr. Thornton (Petition at 14-15).[8] Petitioner presented these very same contentions to the courts below and they were specifically rejected (17a-31a, 140a-44a).

That the two lower courts have resolved these and the other dispositive facts against petitioner is reason enough that the petition should be denied.

II.

PETITIONER'S QUESTIONS I & II RAISE ISSUES OF LAW NOT APPLICABLE TO 35 U.S.C. § 112

Petitioner's first two questions should not be considered for the further reason that they go against the uniform body of law governing constructive reduction to practice. A constructive reduction to practice is shown, and can only be shown according to the statute, 35 U.S.C. § 112, by the patent application itself and what it teaches persons skilled in the art; there is no other standard. *Squires* v. *Corbett*, 560 F.2d 424, 435 (C.C.P.A. 1977). Petitioner would improperly engraft upon the disclosure requirements of that statute a non-statutory requirement for extrinsic evidence, beyond the application itself, showing recognition and appreciation of the invention.

On the facts of this case, petitioner's argument fails because the trial court did find, on all of the evidence presented, that Phillips' inventors did recognize and appreciate the invention; that finding was essential to the court's awarding Phillips' inventors their actual reduction to prac-

[8] With respect to statements made by Dr. Reynolds (Petition at 16), petitioner's same argument was also fully aired before the courts below (Tr. Oral Argument, Third Circuit Court of Appeals, at 89-91, 96), and was rejected because it has no merit (41a n.22).

tice (*see supra* at 6 n.4). Necessary as it is for an actual reduction to practice, however, such evidence of recognition and appreciation is simply not among the requirements of § 112. It has been settled for the last century that an inventor can establish his invention date by a constructive reduction to practice, based solely on his application, with no extrinsic proof at all of having satisfied the requirements for an actual reduction to practice.[9] The court of appeals followed this rule in concluding that reduction to practice may be established "either by reliance on the filing date" of a patent application, which "constitutes constructive reduction to practice," or by proof of "actual reduction to practice" (11a-12a).[10]

The application must, of course, contain a "written description of the invention," which necessarily shows possession of the invention.[11] But the sufficiency of the written description is measured, not by extrinsic evidence of what the inventor may or may not have had in mind when he filed it, but rather, as the statute plainly states, by the written description itself and what it discloses to persons

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[9] *The Telephone Cases*, 126 U.S. 1, 536-37 (1888); *Boyce* v. *Anderson*, 451 F.2d 818, 820 (9th Cir. 1971); *James B. Clow & Sons* v. *United States Pipe & Foundry Co.*, 313 F.2d 46, 48 n.1 (5th Cir. 1963); *Automatic Weighing Mach. Co.* v. *Pneumatic Scale Corp.*, 166 F. 288, 290-91 (1st Cir. 1909); C. RIVISE & A. CAESAR, PATENTABILITY AND VALIDITY § 75, at 119 (1936); 3 D. CHISUM, PATENTS § § 10.05[1]-[2], at 10-74 to 10-77 (1981). *See generally*, Willner, *Origin and Development of the Doctrine of Constructive Reduction to Practice*, 36 J.PAT.OFF. SOC'Y 618 (1954).

[10] The court of appeals properly relied on *Kardulas* v. *Florida Mach. Products Co.*, 438 F.2d 1118, 1120-22 (5th Cir. 1971), and 35 U.S.C. § 102(g).

[11] *In re Edwards*, 568 F.2d 1349, 1351 (C.C.P.A. 1978). *See also Diamond Rubber Co.* v. *Consolidated Rubber Tire Co.*, 220 U.S. 428, 435-36 (1911).

skilled in the art.[12] For this reason, both the trial court and the court of appeals properly focused on what the application disclosed to persons skilled in the art. Both courts below found that the application discloses crystalline polypropylene to one skilled in the art. The law does not require more proof than that.

The four authorities cited by petitioner as requiring extrinsic evidence of "recognition and appreciation" (Petition at 20-22) are all actual reduction to practice cases.[13] Again, on the facts the trial court here found that the requirements of those cases were fully met by Phillips' inventors in their actual reduction to practice of crystalline polypropylene (128a-149a). But none of those authorities supports the importation of that extrinsic evidence requirement into the statutory requirements of a constructive reduction to practice.

The one constructive reduction to practice case discussed at length by petitioner, *Spero* v. *Ringold*, 377 F.2d 652 (C.C.P.A. 1967) (Petition at 18-20), perhaps most exemplifies the error of petitioner's arguments: in *Spero*, there was certainly no extrinsic evidence of recognition and apprecia-

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[12] *Minerals Separation, Ltd.* v. *Hyde*, 242 U.S. 261, 270-71 (1916); *Carnegie Steel Co.* v. *Cambria Iron Co.*, 185 U.S. 403, 437 (1902); *Seabury* v. *Am Ende*, 152 U.S. 561, 567 (1894); *Loom Co.* v. *Higgins*, 105 U.S. 580, 585-86 (1882).

[13] *Silvestri* v. *Grant*, 496 F.2d 593 (C.C.P.A. 1974), *cert. denied*, 420 U.S. 928 (1975); *Breen* v. *Henshaw*, 472 F.2d 1398 (C.C.P.A. 1973); *Langer* v. *Kaufman*, 465 F.2d 915 (C.C.P.A. 1972); and *Hess* v. *Bland*, 347 F.2d 835 (C.C.P.A. 1965). *Langer* v. *Kaufman* also deals with a constructive reduction to practice. There, unlike here, the necessary and inevitable rule required to prove inherency was found not to be satisfied with respect to the patent application urged as a constructive reduction to practice (465 F.2d at 917-19); no issue of recognition was raised in connection with the constructive reduction to practice question.

tion as petitioner here demands; both the inventor, Spero, and all his co-workers admitted that they did not recognize the properties set forth in the count (*Id.* at 656-57). Yet the court found Spero's patent application a constructive reduction to practice of the invention there at issue. The application contained a written description of the new product and that new product was, in fact, the same product defined by the interference count. Under § 112, that is sufficient. While petitioner attempts to deal with the anomaly of its reliance on *Spero* (Petition at 18 n.8), there is no escaping the fact that *Spero* is entirely at odds with the very rule that petitioner seeks to impose on applicants for patents.

Petitioner's remaining constructive reduction to practice authorities[14] merely state the familiar rule of inherency. For example, in *Binstead* v. *Littman*, 242 F.2d 766, 770 (C.C.P.A. 1957), the court held in finding a constructive reduction to practice:

> This is not to say, however, that each limitation in an interference count must be expressly set forth *in haec verba* in the disclosure relied upon. It is sufficient if, as in this case, the specification is so worded that the *necessary and only reasonable* construction to be given the disclosure by one skilled in the art is one which will lend clear support to each positive limitation in the interference count. [Emphasis original.]

This rule was precisely followed by both courts below.[15]

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[14] Other cases relied on by petitioner, including *Wagoner* v. *Barger*, 463 F.2d 1377 (C.C.P.A. 1972), and *Eastman Kodak Co.* v. *E. I. du Pont de Nemours & Co.*, 298 F.Supp. 718, 730 (E.D. Tenn. 1969), deal with the issue of inherency, discussed *infra* at 15-17.

[15] The court of appeals correctly relied on *Plastic Container Corp.* v. *Continental Plastics, Inc.*, 607 F.2d 885, 896 (10th Cir. 1979), *cert. denied*, 444 U.S. 1018 (1980); *Stamicarbon, N.V.* v.

(footnote continued on following page)

III.

THERE IS NO CONFLICT WITH THE INHERENCY CASES

Petitioner could hardly deny that the doctrine of inherency is well-established in the law, and admits that the rule of inherency is set forth in the Third Circuit Court of Appeals' decision in *Stamicarbon, N.V.* v. *Chemical Con-*

(footnote continued from preceding page)

Chem. Constr. Corp., 544 F.2d 645, 652 (3d Cir. 1976); and *In re Wertheim*, 541 F.2d 257, 262 (C.C.P.A. 1976).

The rule has a firm foundation in early decisions of this Court. The reason for the rule is well-illustrated in *Diamond Rubber Co.* v. *Consolidated Rubber Tire Co.*, 220 U.S. 428, 435-36 (1911). There this Court held that what is important for patent purposes is that the inventor make something new and give it to the world, not that the inventor recognize and appreciate all of the invention's properties and characteristics. Late comers in the field, like petitioner, cannot obtain a patent by alleging that they discovered a new property of a product previously invented by others. As this Court stated in *General Elec. Co.* v. *Jewel Incandescent Lamp Co.*, 326 U.S. 242, 249 (1945), "It is not invention to perceive that the product which others had discovered had qualities they failed to detect."

Similarly, a person who never files an application because he has never realized he made anything new at all cannot be an inventor because he has not given anything new to the world. *Eibel Process Co.* v. *Minnesota & Ontario Paper Co.*, 261 U.S. 45, 66-67 (1923); *Tilghman* v. *Proctor*, 102 U.S. 707, 711-17 (1881); *Silvestri* v. *Grant*, 496 F.2d 593, 597 (C.C.P.A. 1974), *cert. denied*, 420 U.S. 928 (1975). These cases, including *General Tire & Rubber Co.* v. *Jefferson Chem. Co.*, 497 F.2d 1283, 1291 (2d Cir.), *cert. denied*, 419 U.S. 968 (1974), discussed in the Petition at 22, are inapplicable here because Phillips' inventors obviously did know they had invented a new product (140a-44a), and did file a patent application disclosing and claiming it.

struction Corp., 544 F.2d 645 (3d Cir. 1976), as well as in *Spero* v. *Ringold*, 377 F.2d 652 (C.C.P.A. 1967) and *In re Nathan*, 328 F.2d 1005 (C.C.P.A. 1964). Yet petitioner argues that the courts below "refused to follow" *Stamicarbon* and "disingenuously" distinguished *Spero* and *Nathan* (Petition at 23-29).[16]

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[16] The rest of petitioner's inherency cases are of no help to it because those cases all apply the very same "invariability" rule which both courts below carefully followed. On the facts in those cases, inherency was not found, but the same rule was applied.

For instance, in *Crome* v. *Morrogh*, 239 F.2d 390 (C.C.P.A. 1956), the evidence showed that the product described in the application did not invariably satisfy the limitation of the count. In *Noyce* v. *Kilby*, 416 F.2d 1391 (C.C.P.A. 1969), *cert. denied*, 400 U.S. 818 (1970), it was found that the limitation in the count that certain conductors be "adherent" to the surface of an insulating layer was not invariably satisfied by the application's description of a product where the conductors were merely "laid down" on the insulating layer. In *Gubelmann* v. *Gang*, 408 F.2d 758 (C.C.P.A. 1969), the count required that the "drive means" of the invention defined therein act positively to restore an actuator element to its original position. The "drive means" described in the involved application, however, did not invariably satisfy this limitation; at best, it merely permitted restoration of the actuator and clearly did not act positively as the count demanded. Similarly, in *Wagoner* v. *Barger*, 463 F.2d 1377 (C.C.P.A. 1972), the count required the extrusion of a film "at a temperature not over about 210° F.," but the application of Barger, when viewed in the light of expert testimony submitted by Wagoner and accepted by the CCPA, did not describe a film that invariably satisfied this limitation. It was possible to read Barger's application in its entirety and still conclude that the film was extruded at a temperature well in excess of "about 210° F." because, in part, Barger stated that the outlet temperature of the extruder was 350 to 360° F.

The other inherency cases relied on by petitioner, including *Paine* v. *Inoue*, 195 U.S.P.Q.(BNA) 598 (Bd.Pat.Int. 1976), *Buddemeyer* v. *Thomas*, 177 U.S.P.Q.(BNA) 81 (Bd.Pat.Int. 1972), and *Natta* v. *Payne*, 165 U.S.P.Q.(BNA) 466 (Bd.Pat.Int. 1970), apply the same rule of law.

The argument fails on the facts, as discussed above; both lower courts found the '53 application satisfies the inherency doctrine. Moreover, there is no basis for petitioner's argument that the court of appeals' decision below is in conflict with the same court's admittedly correct decision in *Stamicarbon* (Petition at 24). Petitioner certainly never called attention to this supposed intracircuit conflict by requesting rehearing, as it should have if it wanted to argue the point here. *Cf. Wisniewski* v. *United States,* 353 U.S. 901 (1957)(per curiam)(dismissing question certified by the United States Court of Appeals for the Eighth Circuit). The fact is, of course, that the court of appeals followed the inherency rule of *Stamicarbon* and said it did (31a-36a). Petitioner's failure to bring its argument to the attention of the court below is a telling indication that petitioner's posited conflict is non-existent.

Petitioner's contention that *Spero* and *Nathan* were misread by the court below is based on petitioner's unsupported and illogical assumption that those courts would not have found inherency if totally irrelevant experiments failed. In neither case is there any indication that irrelevant failures would have been given any weight, and *Spero* itself squarely holds that irrelevant facts will be ignored in determining inherency (377 F.2d at 657 n.2).

CONCLUSION

For the reasons stated, the petition for a writ of certiorari should be denied.

Respectfully submitted,

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Appendix

APPENDIX

PHILLIPS PETROLEUM COMPANY'S SUBSIDIARIES AND AFFILIATES (NOT WHOLLY OWNED)

Acurex Corporation
Aero Oil Company
Alyeska Pipeline Service Company
Artic LNG Transportation Company
Bruin Carbon Dioxide Sales Corporation
Calatrava, Empressa Para La Industria Petroquimica, S.A.
Canada Western Cordage Company Limited
Canyon Reef Carriers, Inc.
Chisholm Pipeline Company
Cochin Refineries Limited
Colonial Pipeline Company
Compagnie Francaise du Carbon Black, S.A.
Dixie Pipeline Company
East Texas Salt Water Disposal Company
Everglades Pipeline Company
Explorer Pipeline Company
Insurance & Reinsurance Brokers (Bermuda) Limited
Iranian Marine International Oil Company
Kaw Pipeline Company
Kenai LNG Corporation
Negromex, S.A.
Nordisk Philblack AB
Norland GmbH fur Grundbesitz und/Industrielanlagen
Norpipe A.S.
Norpipe Petroleum UK Limited
Norsea Gas A/S
Norsea Gas GmbH
Norsea Pipeline Limited
Papago Chemicals, Inc.
Petrochim
Phillips Carbon Black Company (Proprietary) Limited
Phillips Carbon Black Italiana S.p.A.
Phillips Carbon Black Limited
Phillips Gas Supply Corporation
Phillips-Imperial Petroleum Limited

Phillips Pacific Chemical Company
Phillips Petroleum Singapore Chemicals (Private) Limited
Philmac Oils Limited
Plasticos Vanguardia, S.A.
Polar LNG Shipping Corporation
Polyolefins
Quimica Venoco C.A.
Renolit Fertighaus GmbH
Salk Institute Biotechnology/Industrial Associates, Inc.
Seadock, Inc.
Seaway Pipeline, Inc.
Sevalco (Holdings) Limited
Sevalco Limited
Sodefine
SPODCO Limited
Texas Offshore Port, Inc.
Transatlantic Reinsurance Company
Venezoil C.A.
Western Desert Operating Petroleum Company
White River Shale Oil Corporation

Petitioner's Reply Brief

Supreme Court, U.S.
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CLERK

No. 81-1303

IN THE

Supreme Court of the United States

OCTOBER TERM, 1981

STANDARD OIL COMPANY (INDIANA), a corporation of Indiana,

Petitioner,

v.

PHILLIPS PETROLEUM COMPANY, a corporation of Delaware.

ON PETITION FOR A WRIT OF CERTIORARI TO THE UNITED STATES COURT OF APPEALS FOR THE THIRD CIRCUIT

STANDARD'S REPLY BRIEF IN SUPPORT OF PETITION FOR A WRIT OF CERTIORARI

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IN THE

Supreme Court of the United States

OCTOBER TERM, 1981

No. 81-1303

STANDARD OIL COMPANY (INDIANA), a corporation of Indiana,

Petitioner,

v.

PHILLIPS PETROLEUM COMPANY, a corporation of Delaware,

Respondent.

ON PETITION FOR A WRIT OF CERTIORARI TO THE UNITED STATES COURT OF APPEALS FOR THE THIRD CIRCUIT

STANDARD'S REPLY BRIEF IN SUPPORT OF PETITION FOR A WRIT OF CERTIORARI

In its brief in opposition[1] to Standard's petition, Phillips agrees that where its patent application, which is relied upon as a constructive reduction to practice, does not describe the invention in the terms of the interference count[2], the description is adequate under 35 U.S.C. § 112

[1] Phillips' brief in opposition will be referred to as "P.B."

[2] The count reads:

"Normally solid polypropylene, consisting essentially of recurring propylene units, having a substantial crystalline polypropylene content".

only if "the description meets the invariability test of the inherency doctrine" (P.B. 9). The issue of invariability raised by Standard's petition is not, as asserted by Phillips, a question of fact. *To the contrary, it is a question of law;* specifically, whether the inherency doctrine is satisfied when one following the propylene polymerization processes disclosed in the 1953 Phillips application does not always and invariably obtain a material which is the crystalline polypropylene invention at issue.

I. Neither of the Lower Courts in Finding the Phillips 1953 Application to Be a Constructive Reduction to Practice Correctly Applied the Controlling Law of Inherency.

Contrary to Phillips' contention, neither of the courts below found that "one always gets crystalline polypropylene when one reproduces the Phillips 1953 disclosure" (P.B. 10). Rather, the two courts approached the evidence regarding reproductions of the processes disclosed in the Phillips 1953 application from totally different directions. They could conclude that the 1953 application was a constructive reduction to practice only by ignoring the requirement of invariability in the law of inherency as stated by both the Court of Customs and Patent Appeals and the Third Circuit.

The district court was faced with a record which established that one following the process disclosures of the 1953 application as often as not failed to obtain the product of the invention.[3] In order to accommodate the failure of proof on the issue of invariability, the district court premised its decision upon an asserted difference in the law

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[3] Phillips expert Bailey testifying regarding these repetitions admitted there were as many failures as successes and could give no reason why the failures occurred. (JA-IV: B980-84, B995, B999-1010, B1013-15; V: B1193-94, B1208-09, B1213-20, B1222).

of inherency for "product" cases as distinguished from "process" cases (69a-70a); namely, that inherency is established in a process case only if the process works every time but that in a product case the product need not always be obtained.

The district court made this distinction in the face of the controlling inherency authorities represented by, *inter alia, Application of Draeger,* 150 F.2d 572, 574 (C.C.P.A. 1945) and *Stamicarbon, N.V.* v. *Chemical Construction Corp.,* 540 F.2d 645, 652 (3rd Cir., 1976). In *Draeger* the court stated:

> "Inherency does not mean that a thing might be done, or that it might happen, as in the instant case, one out of twenty odd times; but it must be disclosed, if inherency is claimed, that the thing will necessarily happen."

And, in *Stamicarbon* the Third Circuit, relying upon authorities of the Court of Customs and Patent Appeals, stated:

> "[I]nherency 'may not be established by probabilities and possibilities'. Hansgirg v. Kemmer, 102 F.2d 212, 214 (Cust. & Pat. App. 1939). It 'is not sufficient that a person following a disclosure might obtain the result set forth in the count; it must *invariably* happen'. Gubelmann v. Gang, 408 F.2d 758, 766 (Cust. & Pat. App. 1969)." (Emphasis added).

The district court rejected these authorities on the ground that they were process cases. Yet an analysis of the cases dealing with inherency shows that the invariability rule applies whether one is dealing with a process case or a product case. Thus, for example, the following product, device, or machine cases all cite process inherency cases for support: *Noyce* v. *Kilby,* 416 F.2d 1391, 1396 (C.C.P.A. 1969) (electronic device); *Gubelmann* v. *Gang,* 408 F.2d 758, 766 (C.C.P.A. 1969) (adding machine ap-

paratus); *Crome* v. *Morrogh,* 239 F.2d 390, 391-92 (C.C. P.A. 1956) (gray cast iron alloy); *Paine* v. *Inoue,* 195 U.S.P.Q. 598, 602 (Bd.Pat. Int. 1976) (electronic device); *Natta and Crespi* v. *Payne,* 165 U.S.P.Q. 466, 470 (Bd. Pat. Int. 1970) (mixtures of polymers); and *Buddemeyer and Moneymaker* v. *Thomas,* 177 U.S.P.Q. 81, 83 (Bd.Pat.Int. 1972) (yeast product).

The Court of Appeals for the Third Circuit faced with the evidence that there were "many unsuccessful experiments . . . purportedly following Phillips' disclosures" carved yet another exception to the invariability rule of *Stamicarbon.* The court relied upon only the successful repetition experiments with the justification that the use to which they were put related only "to the description in the application" (35a).

Recognizing it was departing from *Stamicarbon* and in an attempt to square itself with the decisions of the Court of Customs and Patent Appeals the court of appeals pointed to two cases, *Spero* v. *Ringold,* 377 F.2d 652, 657 (C.C.P.A. 1967) and *In re Nathan,* 328 F.2d 1005 (C.C.P.A. 1954) and suggested that the conclusions of inherency in those cases were reached even though there may have been "possible unsuccessful results" (34a). As was explained in Standard's petition, neither *Spero* nor *Nathan* justified any conclusion that there were other than successful experiments before the court in those cases. The court in both cases found inherency because the product was invariably produced. (Standard's Petition, pp. 25-27).

If the Third Circuit in affirming the district court is suggesting that invariably successful reproductions are not required to establish inherency, then it is at variance with the authorities of the Court of Customs and Patent Appeals and its own decision in *Stamicarbon.* If it is simply asserting that successful repetition experiments can be considered to give meaning to the description of the product in the application, and thereby establish a disclosure meeting the requirements of 35 U.S.C. § 112, there

is no precedent for such holding. The use of latter day evidence to substitute for contrary conclusions as to what was taught to those skilled in the art by the disclosure in the application *at the time it was prepared* is contrary to the law of the Court of Customs and Patent Appeals in *Spero* v. *Ringold, supra,* discussed below.

II. The Court of Customs and Patent Appeals Rejects Latter Day Interpretations of Data in Substitution for Contemporaneous Conclusions by Skilled Workers in the Art.

Phillips does not argue with Standard's assertion that the court in *Spero* rejected the applicant's attempt to use testimony of a latter day expert witness to establish a constructive reduction to practice. As in the instant case, the expert's testimony interpreting the disclosure in the application was contrary to contemporaneous conclusions reached by skilled workers in the art from such disclosure. (Standard's Petition, pp. 18-20). The court stated (377 F.2d at 657):

> "We are not inclined to accord controlling weight to Professor Jensen's testimony in view of Dr. Berneis' conclusion that appellant was not sure 'which exact compound he would get' from the method of synthesis disclosed in some of the examples. *Thus it appears that appellant himself, presumably a man of ordinary skill in the art, did not know at the time of the preparation of Exhibit 4 the exact configuration of his product.* Dr. Jensen's testimony to the effect that one skilled in the art could predict the steric configuration of the product of appellant's Example 13 does not overcome the effect of the concession made by Dr. Berneis. Cf. Abington Textile Machinery Works v. Carding Specialists (Canada) Ltd., 249 F. Supp. 823, 829 (D.D.C. 1965)." (Emphasis added).

The court of appeals in its finding that the description in the 1953 application was adequate placed itself squarely at issue with the Court of Customs and Patent Appeals in *Spero*. Paralleling *Spero*, Phillips offered no evidence that a skilled polymer chemist in 1953 understood from the 1953 Phillips disclosure that crystalline polypropylene was produced, but offered only expert testimony given 25 years later that one would have so understood in 1953. *The only evidence of what was understood in 1953 from the Phillips application was to the contrary.* The skilled workers and chemists at Phillips did not understand that the ranges of density, melting point, and intrinsic viscosity in the Phillips 1953 application were a disclosure of a crystalline polypropylene which consisted essentially of recurring propylene units. Rather, the conclusions of those individuals were that the material was a highly-branched molecule or that it was cross-linked. (Standard's Petition, pp. 14-15).

One of Phillips' key chemists had no idea of the composition of the Phillips material when he left the company in 1955. (Standard's Petition, p. 14). This lack of understanding was further underscored by the admission by Dr. Reynolds, the Assistant Director of Research at Phillips, who in 1955 upon being advised that Natta had made crystalline polypropylene stated that this achievement was "indeed remarkable" and was a "very basic and important development". (Standard's Petition, p. 16).

Significantly, in 1962 the Patent Office, the administrative agency having the technical expertise to assess what was disclosed by the Phillips 1953 application, rejected that application as a disclosure of the crystalline polypropylene invention at issue. The interference examiner permitted Phillips to participate in the interference only upon the basis of its 1956 application which made more than two dozen references to its polymers in terms of being "crystalline" or having "crystallinity" in

contrast to its 1953 application which made no such reference in its fifty pages. (Standard's Petition, p. 5).

Further, the Board of Patent Interferences after considering the extensive evidence concluded that the 1953 application was not a disclosure in accordance with 35 U.S.C. § 112, because there was "no contemporaneous written record" that the Phillips data was interpreted as showing crystalline polypropylene. Indeed, the Board found that the contemporaneous statements made by the Phillips' skilled workers as to branching and cross-linking "militated against head-to-tail propylene consisting essentially of recurring propylene units". (Standard's Petition, p. 6). Finally, and most significantly, the Board found that there was no description of the Phillips polypropylene as being crystalline in the "full, clear, concise and exact terms" of Section 112 until the workers at Phillips became aware of Natta's disclosure of crystalline polypropylene. (Standard's Petition, p. 7).

Phillips concludes its brief by asserting that *Spero* "squarely holds that irrelevant facts will be ignored in determining inherency" (P.B. 17). Phillips is right. *Spero* did ignore expert testimony given after the fact as being totally irrelevant because there were contemporaneous contrary conclusions reached by skilled workers in the art as to what was understood from the disclosure in the application. But for the fact that reproductions following the application in *Spero invariably* produced the product at issue, the *Spero* court would not have found a constructive reduction to practice. Based on *Spero,* Phillips' effort to establish its 1953 application as a constructive reduction to practice must fail.

CONCLUSION

For the reasons stated herein and in Standard's Petition, the petition for a writ of certiorari should be granted.

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